Service Manual

FILE No.

Ultra-Low Temperature Freezer

MDF-U5386S
MDF-U5386SC

SANYO Electric Co., Ltd.
Biomedical Business Unit

MDF-U5386S

SM9910065

Effective models

This service manual is effective following models.

Model name	Product code	Voltage and Frequency
MDF-U5386S	823 186 52	220V 50Hz
	823 186 53	220V 60Hz
	823 186 54	230/240V 50Hz
MDF-U5386SC	823 186 80	220V 60Hz

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Features

■ Cooling performance

With ambient temperature at 30℃, while internal temperature reaches -86℃.
(The temperature has obtained in continuous operation)

■ Easy operation

- Single action mechanism has been adopted for the new outer door latch.
- New control panel has been adopted.
- New mechanism for condenser filter realizes to replace it easier.
- New gasket and 'Eagle latch' have been adopted for inner door insulation.

■ Large capacity

- Storing capacity for inventory rack has 483L (17.1cu.ft.) that can accommodate 320pcs of 2" inventory box (IR-220U x 16racks) for MDF-U5386S.

■ Environmental friendly

- HFC refrigerant (R-407D) has been adopted for H side and also HFC refrigerant (R-508) has been adopted for L side.
- HCFC FREE CP urethane foaming has been adopted for frame insulation.

■ New latch mechanism

Pad lock mechanism has been adopted for the new outer door latch.
Insulation inner door has been adopted with new inner door latch.

■ Easy operation

- New control panel is installed on the front panel
- Easy operation for replacing the condenser filter

■ New temperature control P.C.B.

- Selectable temperature alarm (5℃~20℃ for high temp. alarm, -5℃～-20℃ for low temp. alarm)
- Power failure alarm and remote alarm terminal are kept in non-volatile memory
- Filter alarm and battery alarm function

■ Optional component

- Automatic temperature recorder: MTR-G85/MTR-85H
- Recorder mounting kit: MDF-S3085 for MTR-85H
- Back-up system: CVK-UB2
- Inventory rack: IR-220U

Specifications

■Structural specifications

Item	MDF-U5386S	MDF-U5386SC
External dimensions	W890 x D875 x H1990 (mm) W35.0 x D34.4 x H78.3 (inch)	
Internal dimensions	W630 x D600 x H1280 (mm) W24.8 x D23.6 x H50.4 (inch)	
Effective capacity	483L (17.1cu.ft)	
Outer door	1door, painted steel	
Inner door	2doors, ABS resin panel with stainless frame	
Insulation	Rigid-polyurethane foam insulation material contained (HCFC free)	
Exterior	Painted steel	
Interior	Painted steel	
Shelf	3shelves, stainless steel	
Outer door latch	1pc, new locked-in type	
Outer door lock	1pc	
Caster	4pcs,（2 leveling foot at front）	
Access port	ϕ17mm, 3places (back, bottom left/right corner)	
Net weight	315 kg	320 kg
Cooling performance	-86℃ at the center of the chamber（AT30℃, no load）	
Refrigeration circuit	Secondary cooling system	
Compressor	H side: 1100W, hermetic type L side: 1100W, hermetic type	
Oil separator	SPK-0S02S2	
Refrigerant	H side: HFC refrigerant(R-407D） L side: HFC refrigerant (R-508）	
Refrigerant oil	Ze-NIUS32SA	
Evaporator	H side：Cascade condenser L side：Tube on sheet	
Condenser	H side：Fin and tube L side：Cascade condenser	
Power supply	Local voltage	
Accessories	1 set of keys, 1 scraper	

■Control specifications

Item		MDF-U5386S/U5386SC
Temperature controller		Microprocessor controlled system: Key-pad input Temperature set range: -50℃~-90℃ (1℃ increment) Set value kept in non-volatile memory
Temperature sensor		Pt.1000Ω
Temperature display		LED digital display（1℃ increment）
Alarm	Temperature	Selectable with 5℃~20℃ for high temp. alarm and -5℃~-20℃ for low temp. alarm ALARM lamp blinks and intermittent buzzer beeps with 15min.of delay Remote alarm contact: Normal Open, rating 30VDC, 2A Temperature alarm turns on during power failure (not linked with buzzer)
	Door	None
	Filter	Filter check lamp (FILTER) is lit with intermittent buzzer beeps.
	Power failure	ALARM lamp blinks with intermittent buzzer beeps, remote alarm outputs.
	Remote alarm	3P remote alarm terminal: Maximum 30VDC, 2A NC-COM、NO-COM Outputs during temperature alarm and power failure alarm
	Battery	BATTERY lamp is lit. Accumulating period: 2.8 years
Control panel		Lamp: ALARM, FILTER, BATTERY BUZZER: Buzzer key ALARM TEST: Alarm test key SET: To switch SV and PV ＞: To shift the digit Λ: To change the digit
Self diagnosis function		When any failure occurs among the temperature sensor, filter Sensor, cascade sensor and AT sensor; ・Error code and internal temp.(PV) are alternately displayed. ・Remote alarm contact is ON and the buzzer beeps.
Power switch		Breaker switch（250VAC, 15A）
Compressor protection		When the temperature of cascade sensor is -34℃ or lower, the compressor L is turned on. When the temperature of cascade sensor is -12℃ or higher, the compressor L is turned off. Overload relay and compressor H are controlled.
Optional components		Automatic temperature recorder: MTR-G85/MTR-85H Recorder mounting kit: MDF-S3085 for MTR-85H Back-up system: CVK-UB2 Inventory rack: IR-220U Interface board: MTR-480

■**Performance specifications**

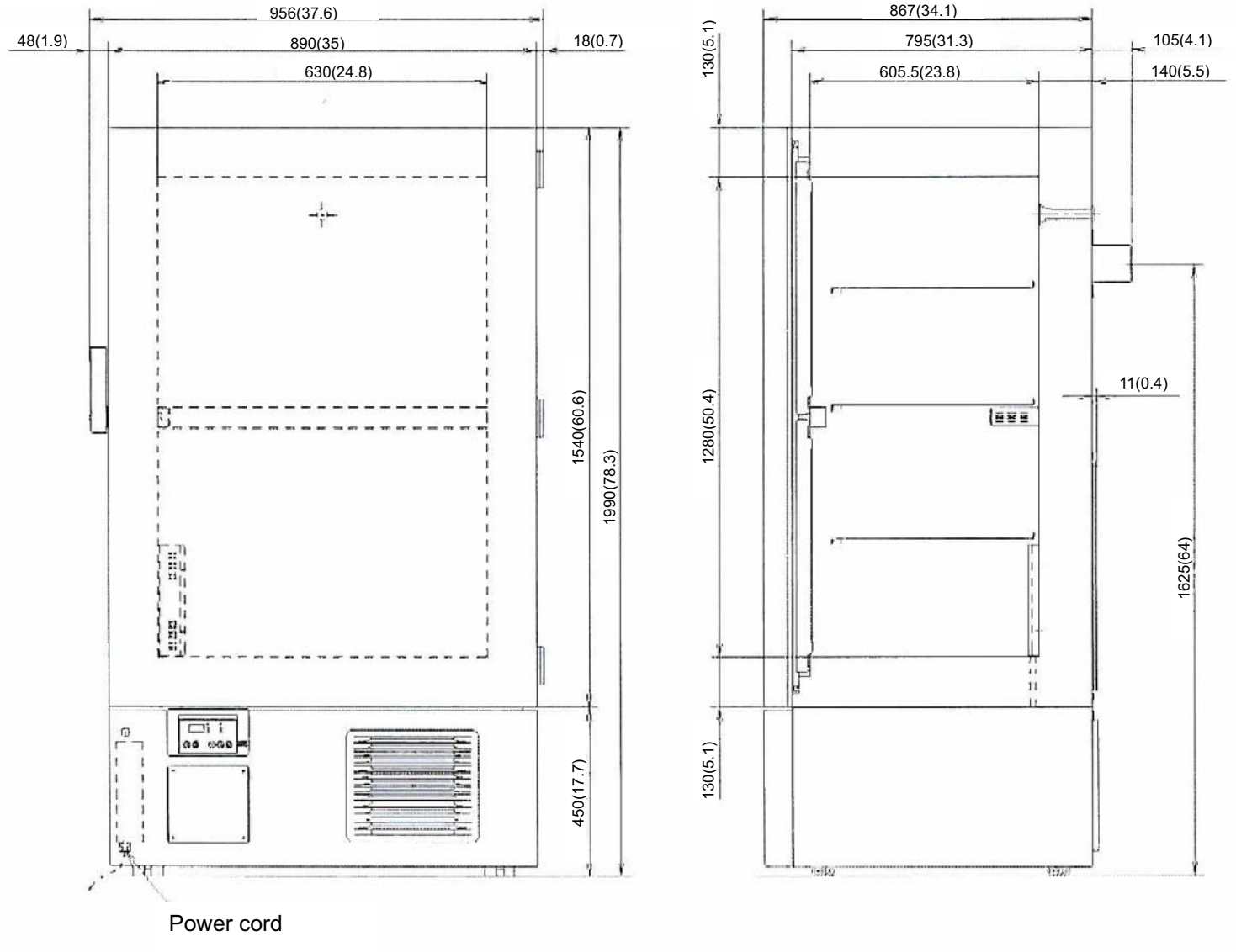
<MDF-U5386S/U5386SC>

Cooling performance	-86℃ at the center of the chamber (AT 30℃, no load)			
Temperature control range	-50℃ to -86℃ (AT 30℃, no load)			
Power source	220V, 50Hz	220V, 60Hz	230V, 50Hz	240V, 50Hz
Rated power consumption	1080W	1180W	1070W	1100W
Noise level	49 dB [A] (background noise; 20dB)			
Maximum pressure	2.7 MPa			

* Specifications will be subject to change without notice.

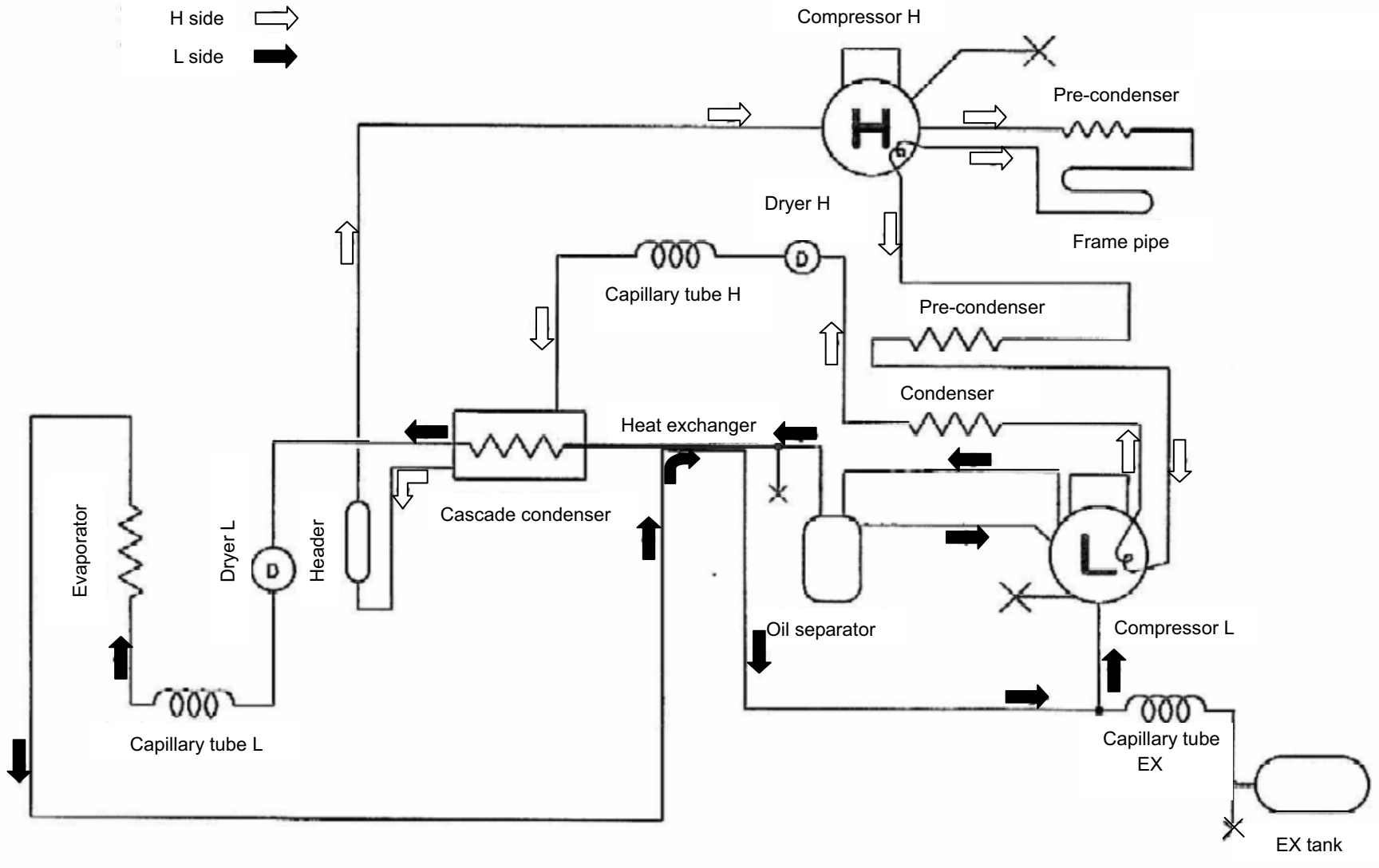
Dimensions

<MDF-U5386S>



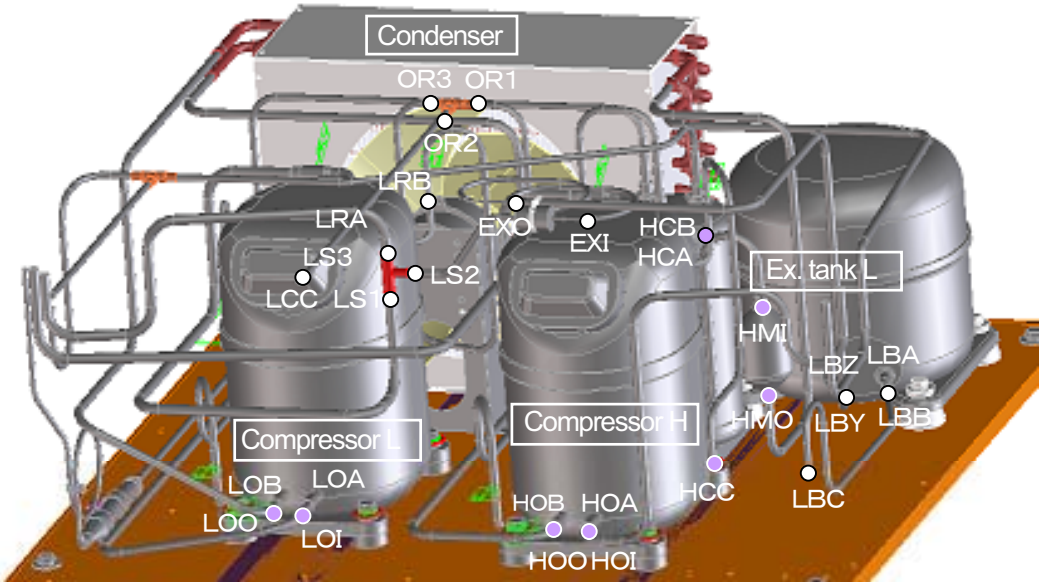
Power cord

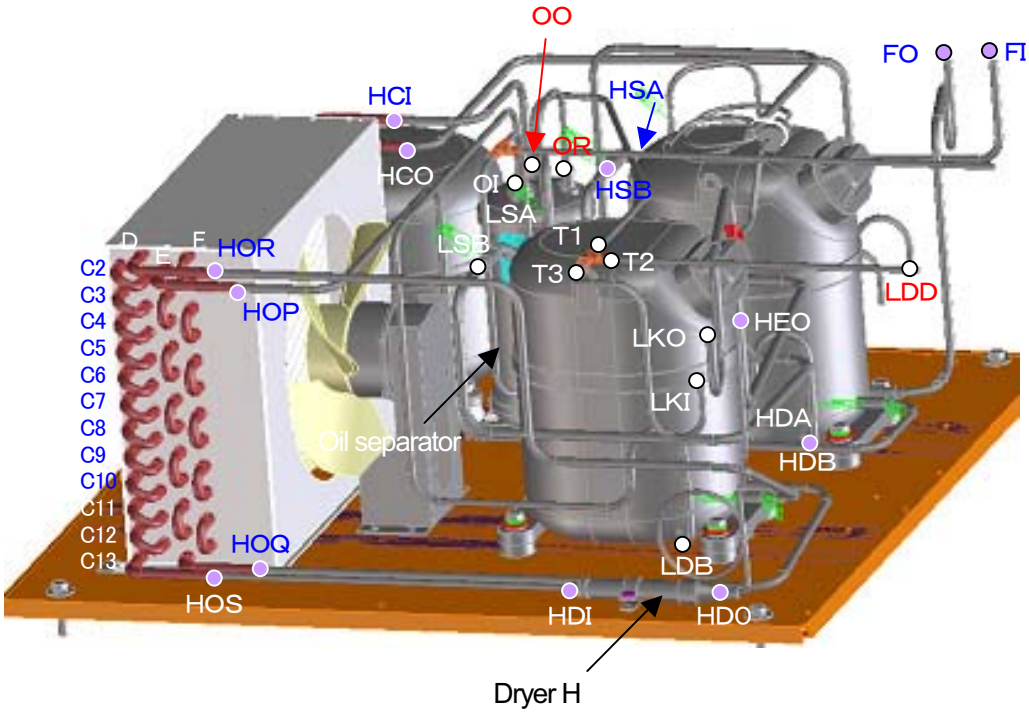
Refrigeration circuit



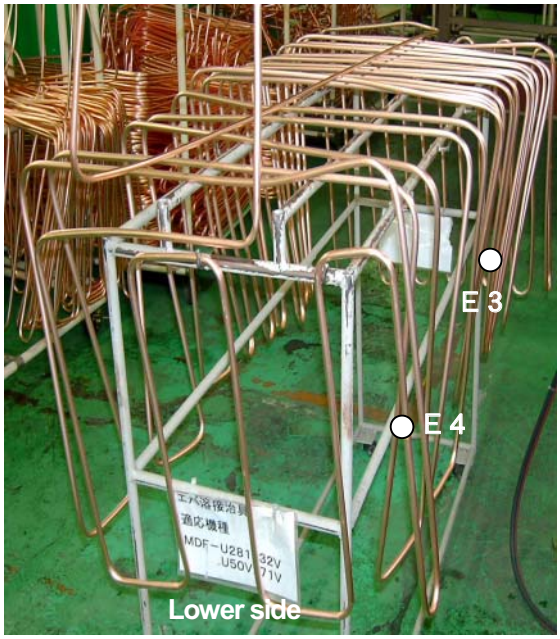
Refrigeration circuit welding points

1. Unit Base Ass'y

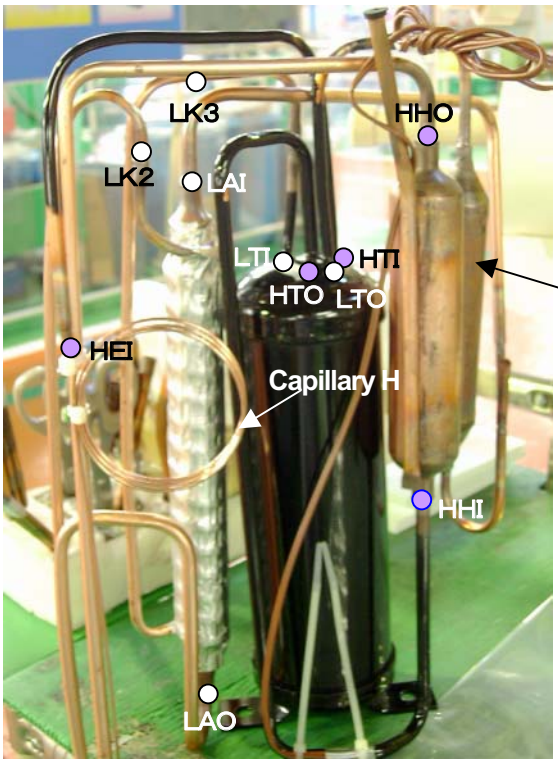




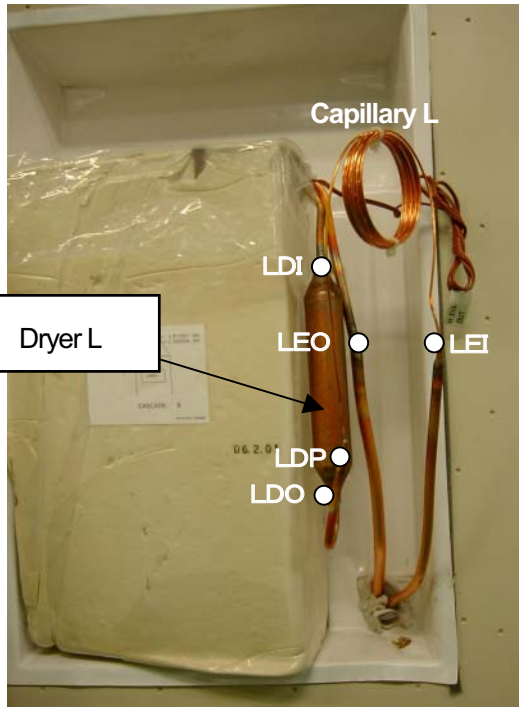
2. **Evaporator is laid inside of foaming.**



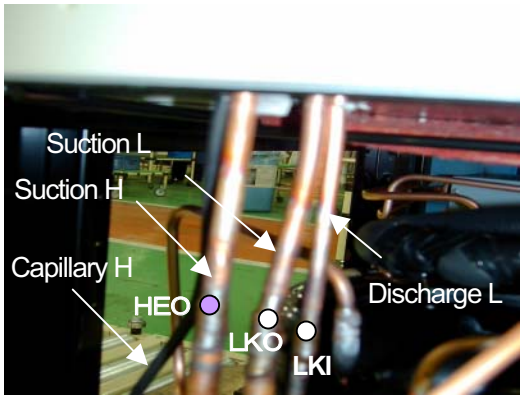
3. **Cascade condenser is laid inside of foaming.**



Connection of cascade condenser



Connection for cascade condenser

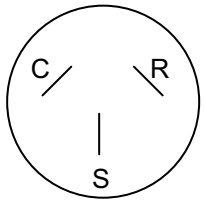


Cooling unit parts

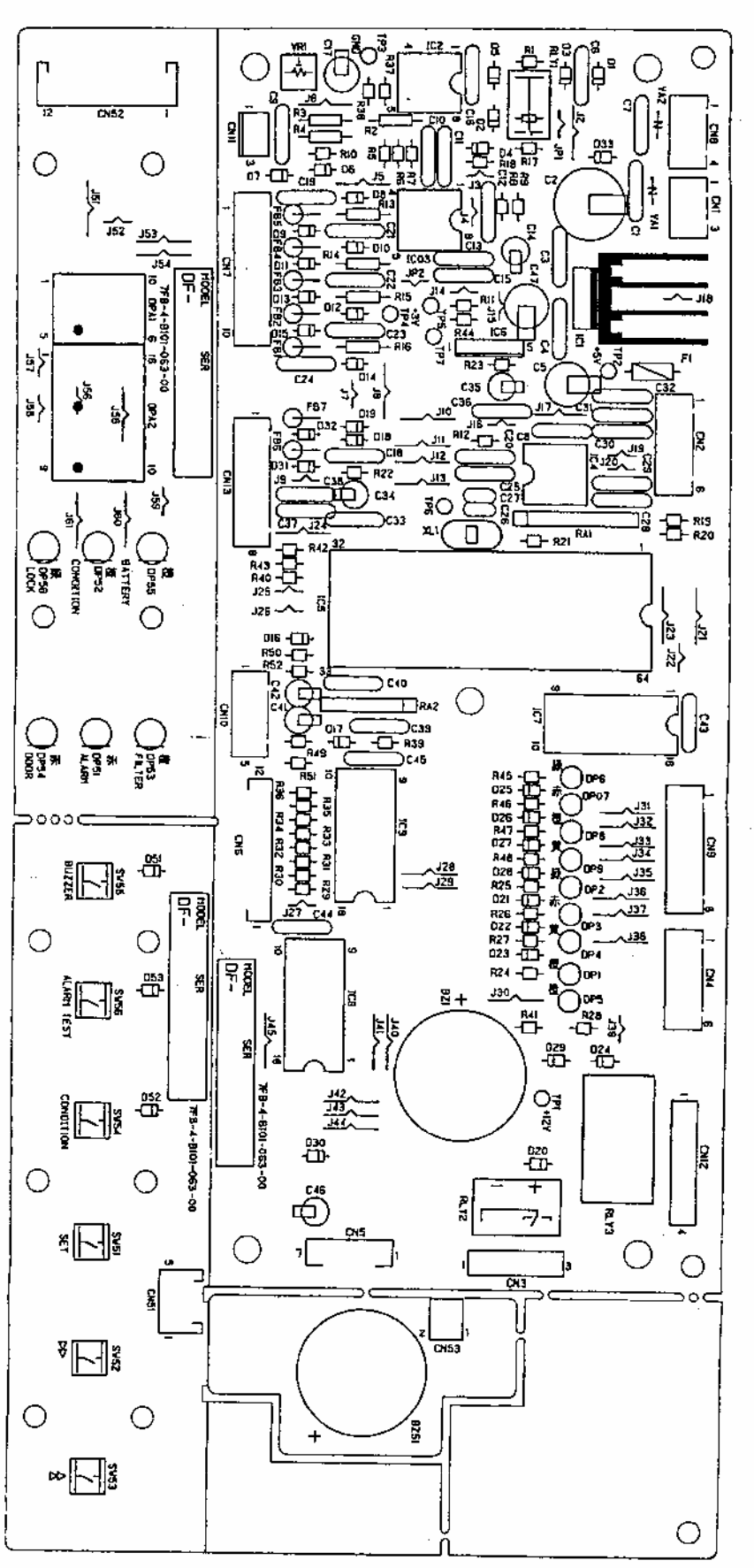
<MDF-U5386S/U5386SC>

Item	Specifications		
	H side		L side
Compressor	220V, 60Hz	220/230V, 50Hz	230/240V, 50Hz
Code	7FB-0-M101-001-06	7FB-0-M101-001-04	7FB-0-M101-001-05
Type	KS370J1NS-7A	KS370J1NS-4A	KS370J1NS-4A1
Refrigerant oil	Ze-NIUS32SA Charged q'ty: 850cc		Ze-NIUS32SA Charged q'ty: 850cc
Cooling system	Forced air cooling (partially) Oil cooler		Forced air cooling (partially) Oil cooler
Condenser			
Type	Fin and tube		Cascade condenser
Condenser	12 columns x 4 lines P6.35mm Fin 88pcs.		Coil pipe ϕ6.35mm
Pre-condenser	W 250mm		——
Frame pipe	ϕ6.35mm		——
Evaporator Type	Cascade condenser Shell and tube ϕ80mm		Tube on sheet ϕ9.52mm
Capillary tube			Ex. capillary
Resistance PSI	94 PSI/G	98 PSI/G	34 PSI/G
Length	1800mm	1200mm	500mm
Outer diameter	ϕ2.4mm	ϕ2.0mm	ϕ2.4mm
Inner diameter	ϕ1.2mm	(ϕ0.9mm)	ϕ1.2mm
Refrigerant	R-407D Charged q'ty: 503g		R-508 Charged q'ty: 245g
Oil additive	n-Pentane Charged-q'ty: 54cc (32.1g)		n-Pentane Charged q'ty: 55cc (34.7g)
Dryer	4A-XH-9 Charged q'ty: 18g		4A-XH-6 Charged q'ty: 58g
Condensing fan	ϕ230 mm、4 blades Material: ABS		
Condensing fan motor Type	SE4-E11L5P		
Oil separator	——		SPK-0S02S2 (810-4-2008)

<Compressor terminals layout>



Components on PCB



Electrical Parts

MDF-U5386S/U5386SC		AC220V,60Hz	AC220/230V,50Hz	AC230/240V,50Hz
Compressor (H),(L)	Type	KS370J1NS-7A	KS370J1NS-4A	KS370J1NS-4AI
	Code	7FB-0-M101-001-06	7FB-0-M101-001-04	7FB-0-M101-001-05
	Rated voltage (50/60Hz)	220V, 60Hz	220/230V, 50Hz	230/240V, 50Hz
	Winding resistance C-S(Aux)	1.64Ω	2.53Ω	2.53Ω
	C-R(Main)	3.35Ω	4.8Ω	4.8Ω
Starting relay(H), (L)	Type	AMVL-300A	AMVL-300A	AMVL-300A
	Pick up voltage	215~247VAC(60Hz)	185~217VAC(50Hz)	185~217VAC(50Hz)
	Drop out voltage	69~132VAC(60Hz)	60~120VAC(50Hz)	60~120VAC(50Hz)
Overload relay (H), (L)	Type	MST16AG135/69	MST16AJ135/69	MST16AJ135/69
	Action to the temp. (no current)	ON:69±11℃ OFF:135±5℃	ON:69±11℃ OFF:135±5℃	ON:69±11℃ OFF:135±5℃
	Action to the current (AT25℃)	29.5A	22.5A	22.5A
	Operation time	6~16sec.	6~16sec.	6~16sec.
	Non-Action to the temp. (80℃)			
	Non-Action			
	Action			
Starting capacitor(H),(L)	Rating	250VAC, 160MF	250VAC, 100MF	250VAC, 100MF
Running capacitor (H),(L)	Rating	400VAC, 25MF	400VAC, 25MF	400VAC, 25MF
Condensing fan motor	Type	SE4-E11L5P	SE4-E11L5P	SE4-E11L5P
	Rating	220-240VAC	220-240VAC	220-240VAC
	Thermal fuse			
Cap.tube heater	Rating	230V, 12W	230V, 12W	230V, 12W
	Resistance(25℃)			
H Comp. relay	Type	G4F-11123T	G4F-11123T	G4F-11123T
	Contact capacity	20A, 250VAC	20A, 250VAC	20A, 250VAC
	Coil	12VDC	12VDC	12VDC
Heater relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Contact capacity	10A, 250VAC	10A, 250VAC	10A, 250VAC
	Coil	12VDC	12VDC	12VDC
Temp. control relay	Type	G4F-11123T	G4F-11123T	G4F-11123T
	Contact capacity	20A, 250VAC	20A, 250VAC	20A, 250VAC
	Coil	12VDC	12VDC	12VDC
Switching power supply	Type	LDA10F-12	LDA10F-12	LDA10F-12
	Rated output	12VDC, 0.9A	12VDC, 0.9A	12VDC, 0.9A
Temperature sensor	Type	SS-12-T	SS-12-T	SS-12-T
	Rating	1000Ω	1000Ω	1000Ω
AT sensor	Type	502AT	502AT	502AT
	Rating	5KΩ, 25℃	5KΩ, 25℃	5KΩ, 25℃
Filter sensor	Type	502AT	502AT	502AT
	Rating	5KΩ, 25℃	5KΩ, 25℃	5KΩ, 25℃
Cascade sensor	Type	502AT	502AT	502AT
	Rating	5KΩ, 25℃	5KΩ, 25℃	5KΩ, 25℃
Breaker switch	Type	BAM215131	BAM215131	BAM215131
	Rating	250V, 15A	250V, 15A	250V, 15A
Noise filter	Type	ZAC2220-11	ZAC2220-11	ZAC2220-11
	Rating	250VAC, 160MF	250VAC, 160MF	250VAC, 160MF
Power cord	Type	GTVD-2,3	GTVD-2,3	GTVD-2,3
Battery switch	Type	SLE6A2-5	SLE6A2-5	SLE6A2-5
	Rating	250VAC, 4A	250VAC, 4A	250VAC, 4A
Battery	Type	5HR-AAC	5HR-AAC	5HR-AAC
	Rating	6V, 1100mAH	6V, 1100mAH	6V, 1100mAH
Power transformer (MDF-U5386SC only)	Type	ATR-D35003		
	Primary	208V		
	Secondary	230V		
Boost relay (MDF-U5386SC only)	Type	G7L-1A-TUB		
	Rating	30A, 220V, DC24V		
Power relay (MDF-U5386SC only)	Type	DS1E-M-DC12V		
	Rating	12V, 0.4A, 125V		
Breaker switch (MDF-U5386SC only)	Type	IR11A2E201R		
	Rating	250VAC, 20A		

* Note)

For the compressor specified for China;
Type: KS370J1NS-4AD (CCC authorized)

Specifications of sensor

1. Temperature of temp. sensor (Pt1000Ω) and the resistance value

Temperature (℃)	Resistance value (kΩ)	Temperature (℃)	Resistance value (kΩ)	Temperature (℃)	Resistance value (kΩ)
−140	450.83	−70	729.99	0	1000.0
−130	491.47	−60	769.02	10	1038.0
−120	531.83	−50	807.87	20	1076.0
−110	571.92	−40	846.58	30	1113.8
−100	611.76	−30	885.13	40	1151.4
−90	651.38	−20	923.55	50	1189.0
−80	690.78	−10	961.84	60	1226.4

2. Temperature of thermistor (type 502AT) and the resistance value

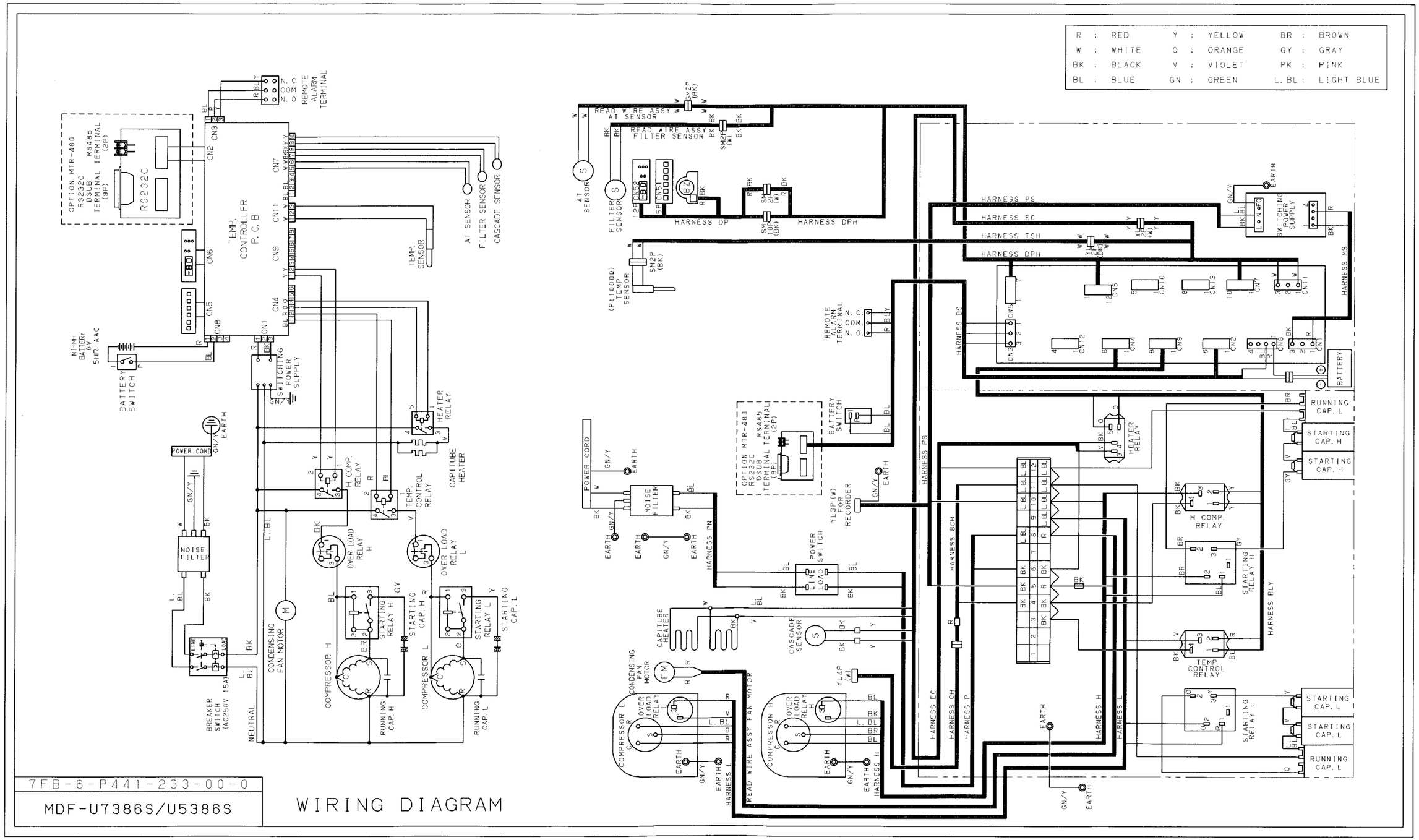
Temperature (℃)	Resistance value (kΩ)	Temperature (℃)	Resistance value (kΩ)	Temperature (℃)	Resistance value (kΩ)
−50	154.50	−7	17.92	12	8.17
−45	116.50	−6	17.16	13	7.85
−40	88.85	−5	16.43	14	7.55
−35	68.15	−4	15.74	15	7.27
−30	52.84	−3	15.08	16	6.99
−25	41.19	−2	14.45	17	6.73
−20	32.43	−1	13.86	18	6.48
−19	30.92	0	13.29	19	6.24
−18	29.50	1	12.74	20	6.01
−17	28.14	2	12.22	25	5.00
−16	26.87	3	11.72	30	4.18
−15	25.65	4	11.25	35	3.51
−14	24.51	5	10.80	40	2.96
−13	23.42	6	10.37	45	2.51
−12	22.39	7	9.96	50	2.14
−11	21.41	8	9.57	55	1.83
−10	20.48	9	9.20	60	1.57
−9	19.58	10	8.84		
−8	18.73	11	8.49		

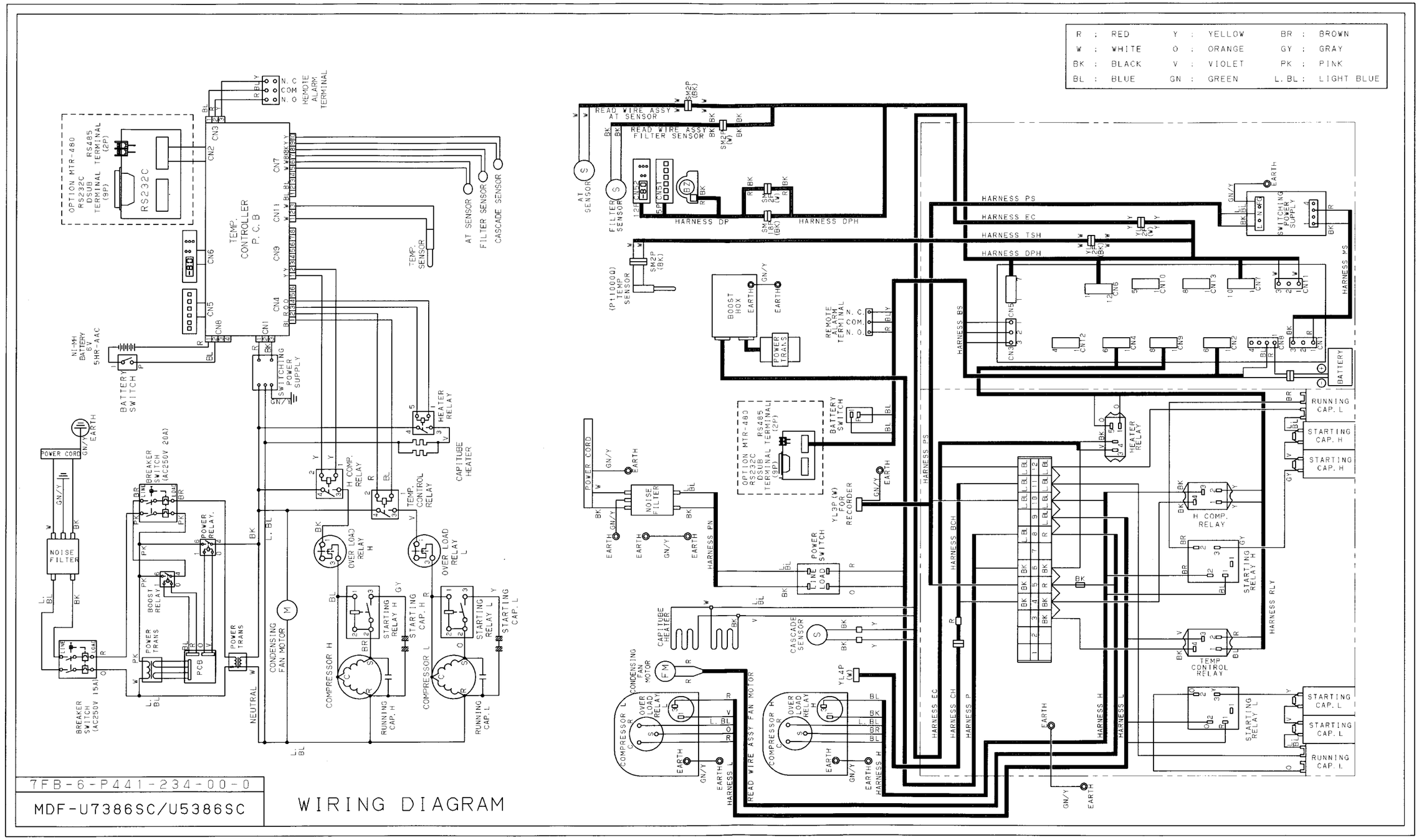
Connections on PCB

The following shows the connections of connectors on the control PCB.

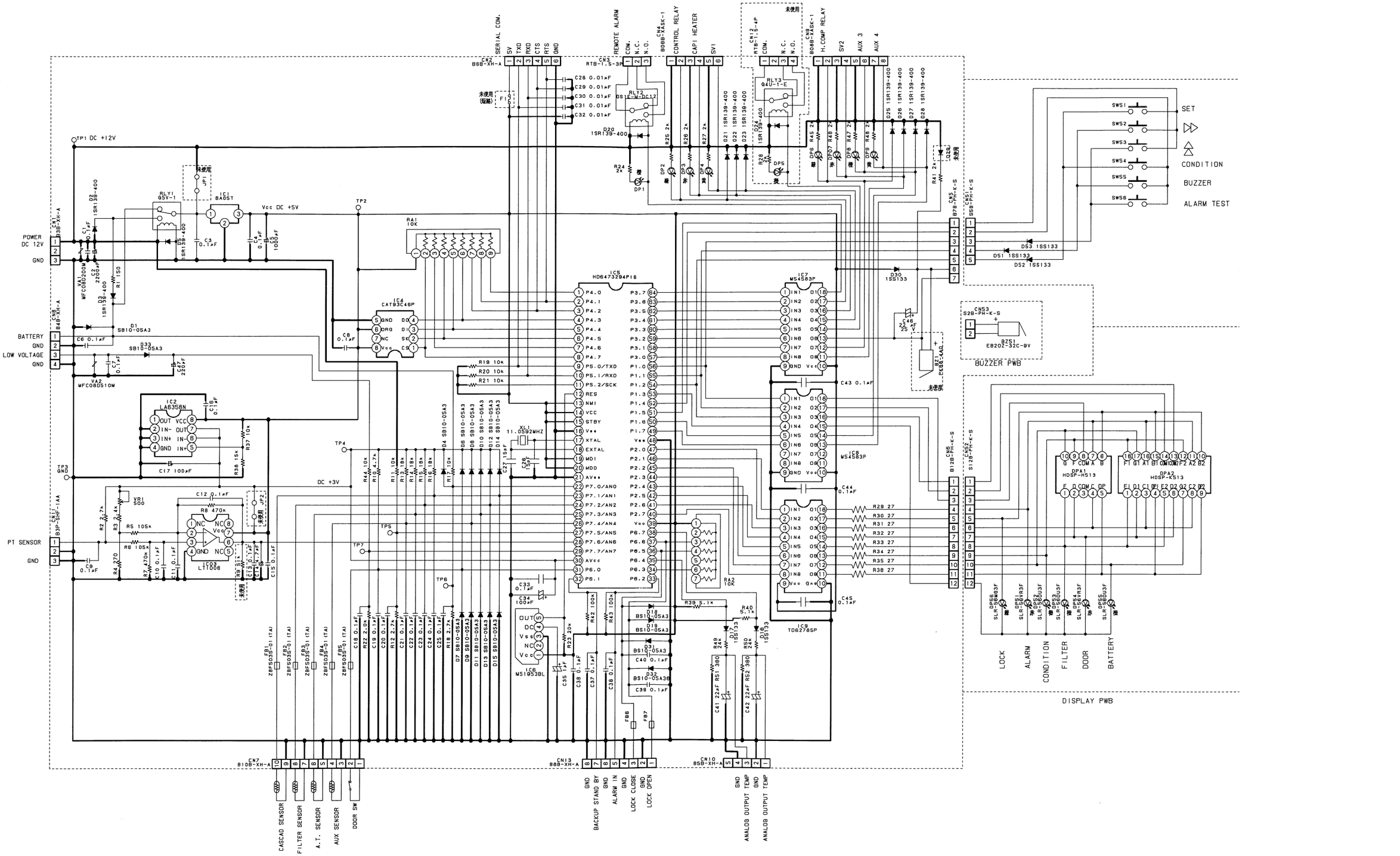
Connector	Connects to	Usage
CN1	Switching power supply	To supply the power to PCB.
CN2	Network interface	To connect to MTR-480（option）
CN3	Remote alarm terminal #1: COM. #2: N.O. #3: N.C.	Remote alarm contact outputs. In normal condition, open for #1-#2 and closed for #1-#3.
CN4	#1-#2：Temp. control relay #3-#4：Heater relay	To control internal temperature (12VDC) To supply the power to Cap. tube heater (12VDC)
CN5	#1-#5: Switch PCB #6-#7: Buzzer	To connect to each switch
CN6	Display PCB	To connect to each LED
CN7	#5-#6: AT sensor #7-#8: Filter sensor #9-#10: Cascade sensor	To detect the ambient temperature To detect the temperature in condenser outlet pipe. To detect the temperature in cascade.
CN8	#1-#2: Battery （#1:6V #2:Battery switch）	To supply the power during power failure
CN9	#1-#2: H. Comp. relay	To control compressor H ON/OFF (12VDC)
CN10	Unused	
CN11	#1-#3: Temp. sensor	To detect the internal temperature.

Wiring Diagram




R : RED
Y : YELLOW
BR : BROWN
W : WHITE
O : ORANGE
GY : GRAY
BK : BLACK
V : VIOLET
PK : PINK
BL : BLUE
GN : GREEN
L.BL : LIGHT BLUE
OPTION MTR-480
RS232C
RS485
DSUB
TERMINAL
(2P)
(9P)
RS232C
TEMP. CONTROLLER P.C.B
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN11
REMOTE ALARM TERMINAL
N.C
COM
N.O
RELAY
TEMP. SENSOR
AT SENSOR
FILTER SENSOR
CASCADE SENSOR
NI-MH BATTERY 6V 5HR-AAC
BATTERY SWITCH
SWITCHING POWER SUPPLY
HEATER RELAY
CAPITUBE HEATER
POWER CORD
EARTH
BREAKER SWITCH (AC250V 20A)
NOISE FILTER
POWER RELAY
BOOST RELAY
POWER TRANS
PCB
BREAKER SWITCH (AC250V 15A)
NEUTRAL
CONDENSING FAN MOTOR
H COMP. RELAY
TEMP. CONTROL RELAY
OVER LOAD RELAY H
OVER LOAD RELAY L
STARTING RELAY H
STARTING RELAY L
STARTING CAP. H
STARTING CAP. L
RUNNING CAP. H
RUNNING CAP. L
COMPRESSOR H
COMPRESSOR L
READ WIRE ASSY AT SENSOR
READ WIRE ASSY FILTER SENSOR
SM2P (BK)
SM2P (W)
(P110000) TEMP SENSOR
BOOST HOX
POWER TRANS
HARNESS DP
HARNESS DPH
HARNESS PS
HARNESS EC
HARNESS TSH
HARNESS MS
HARNESS BS
HARNESS RLY
HARNESS PN
HARNESS BCH
HARNESS CH
HARNESS P
HARNESS H
HARNESS L
OPTION MTR-480
RS232C
RS485
DSUB
TERMINAL
(2P)
BATTERY SWITCH
YL2P (W)
FOR RECORDER
POWER SWITCH
ON
LOAD
7FB-6-P441-234-00-0
MDF-U7386SC/U5386SC
WIRING DIAGRAM

Circuit Diagram



Control specification

1. Key and Switch

BUZZER : In alarm condition, buzzer stops sounding with this key pressed.
Remote alarm output and alarm message would not be off.
During the power failure (battery back-up), press the key to show the present temperature of PT sensor.

ALARM TEST : With this key pressed to activate alarm test mode to be forcibly step into alarm condition (ALARM lamp blinks, intermittent buzzer beeps, digital LED goes off and remote alarm inputs).
After approx. 90seconds then, normal condition retrieves with Auto Return function.
With the battery switch turns off, “E09” blinks on the display.

SET : Press this key once to activate set mode (2nd digit in LED blinks), press the key again to store the value to be changed.
With Key Lock setting mode (“L 0” or “L 1” is displayed), press the key to store the value to be changed.

STATUS : Unavailable

▶▶ During setting mode, the blinking digit shifts among the 1st digit or the 2nd digit or 3rd digit.

▲▲ During setting mode, count the blinking digit up. In PV display, press the key over 5 seconds to enter the function mode. (“F00” is displayed)

2. Temperature control

Setting range : -50℃~-90℃

Display range : -180℃~50℃

Setting procedure : Press SET key and set the required value with ▲▲ key and ▶▶ key. Press SET key to store the set value.

Out of setting range : If you try to set the value which is out of temperature setting range, it is unacceptable with buzzer beeps for 1second.

3. Temperature alarm

Setting range : High temperature alarm … 5℃~20℃ (Initial setting: 10℃)
Low temperature alarm …. -5℃~-20℃ (initial setting: -10℃)

Setting procedure : Keep pressing ▲▲ key over 5 seconds to enter function mode (F00). Input “F01” for high temperature alarm or “F02” for low temperature alarm. Press SET key to set the value to be changed with the 1st digit blinks. Press SET key again to store the value in the non-volatile memory.

Out of setting range : If you try to set the value which is out of alarm setting range, it is unacceptable with buzzer beeps for 1 second.

4. Key Lock mode and Function mode

A) Key Lock mode

Setting range : 0, 1

Setting procedure: In PV display, keep pressing ▶▶ key over 5 seconds to enter into Key Lock mode. (“L_0” or “L_1” is displayed. initial: L_0) with “0” or “1” blinks. Change the value with ▲▲ key and press SET key to store the value in the non-volatile memory.

B) Function mode

Setting range : 00~31

Display range : 00~39
00, 04, 16, 20 and 32~39 are unavailable.

Setting procedure : In PV display, keep pressing ⏫ key over 5 seconds to enter function mode (F00 is displayed). Change the blinking 1st digit to desired function code with ⏫ key and ⏩ key. Press SET key to be function code available.
If you input 00, 04, 15, 16 and 20 then press SET key, automatically revert to PV display.

Out of setting range : If you try to set the value which is out of setting range (e.g. F32~F39), it is unacceptable with automatically revert to PV display.

5. Warning function

High temp. alarm : When PV is reached at SV+SV_H (high temp. alarm SV) +1 or higher, ALARM lamp and LED display blinks, intermittent buzzer beeps with approx. 15 minutes of delay and remote alarm output turns on.
When PV is reached at SV+ SV_H or lower, ALARM lamp and LED display go off, buzzer stops beeping and remote alarm output turns off.
If you press BUZZER key, the buzzer stops beeping instead remote alarm output does not turn off.

Low temp. alarm : When PV is reached at SV-SV_L (low temp. alarm SV) -1 or lower, ALARM lamp and LED display blinks, intermittent buzzer beeps with approx. 15 minutes of delay and remote alarm output turns on.
When PV is reached at SV- SV_L or lower, ALARM lamp and LED display go off, buzzer stops beeping and remote alarm output turns off.
If you press BUZZER key, the buzzer stops beeping instead remote alarm output does not turn off.

Filter blockage : With the filter sensor temperature is reached at 48.0℃ or higher, FILTER lamp is lit.
With the filter sensor temperature is reached at 43.0℃ or lower, FILTER lamp goes off.
Lamp blinks simultaneously with buzzer beeps in initial setting '001'.
The value '001' is changeable to '000' in F31.

6. Other function

Cascade control : Compressor (L) is allowed to turn on when the cascade sensor temperature is reached at -34.1℃ or lower during pull-down.
Compressor (L) is allowed to turn off when the cascade sensor temperature is reached at -12.0℃ or higher during pull-up.

Auto Return : If there is not any key operation for 90 seconds in each setting mode, Key Lock mode and Function mode, automatically reverts to PV mode.
Note) Auto Return is not worked in F09 and F10.

Sensor temperature : F12: Temperature of temp. sensor is displayed
(Ex. -80.2℃ → displayed as '80.2')
F13: Temperature of cascade sensor is displayed.
(Ex. -34℃ → displayed as '-34℃')
F14: Temperature of filter sensor is displayed.
(Ex. 67℃ → displayed as '067')
F15: Temperature of AT sensor is displayed.
(Ex. 30℃ → displayed as '030')

Battery accumulating time : F03: Battery accumulating time is displayed.
(Ex. 2years and 6months consumed → displayed as '02.5')

<Timing to replace battery>
The display shows '02.8' to inform the battery exhaustion.
Replace new battery and step into F06 to input '409' to reset.
Press SET key to turn F03 display to '00.0' with BATTERY lamp goes off.

ROM version : F30: ROM version is displayed (Ex. Ver. 1.00 → displayed as "1.00")

Abnormal temp. in compressor : Alarm for compressor H inoperative:
E10 and PV are alternately displayed, and intermittent buzzer emitted when remote alarm is not output. Press BZ key to stop buzzer beeping.
Protection:
When E10 is displayed, compressor H is forcibly turned off.
(Lamp DP6 goes off)
Compressor H is permitted to turn on once E10 goes off.

7. Function mode

F00	Automatically revert to PV display
F01	SV_H (high temp. alarm SV) setting
F02	SV_L (low temp. alarm SV) setting
F03	Battery accumulating time display
F04	Automatically revert to PV display
F05	Compressor (H)/(L) delay time setting
F06	Service code input (code: 384)
F07	Temperature Zero Adjustment
F08	Automatically revert to PV display
F09	Factory test mode …… Unavailable
F10	Factory test mode …… Unavailable
F11	Factory test mode …… Unavailable
F12	Temperature of temp. sensor is displayed
F13	Temperature of cascade sensor is displayed
F14	Temperature of filter sensor is displayed
F15	Temperature of AT sensor is displayed
F16	Automatically revert to PV display
F17	Model code setting (non-volatile ROM and memory initialization)
F18	Capillary heater is forcibly turned on/off
F19	Factory test mode …… Unavailable
F20	Automatically revert to PV display
F21	Communication ID set
F22	Communication mode set
F23	Unavailable
F24	Remote alarm terminal output
F25	Ring-back time set
F26	Actual operation ratio is displayed
F27	Unavailable
F28	Unavailable
F29	Unavailable
F30	ROM version is displayed
F31	Filter alarm

Setting procedure: In PV display, keep pressing ⏫ key over 5seconds to display "F00".
Input the desired function code with ⏫ key and ⏩ key.
Press SET key to be function mode available.
Note) You should input service code in F06 prior to use F07~F20, F23, F26~F30.
To cancel service code, input "000" in F06 or turn the power off.

F00: <Purpose> Simply passing through if entered by mistake.
<Operation> Press SET key in “F00” displayed to revert to PV display.

F01: <Purpose> SV_H (high temp. alarm SV) setting
<Operation> Input F01 and press SET key to display “010” (initial value).
Set the value in the range “005”~“020” with ▲▲ key. Press SET key to store the value and revert to PV display.

F02: <Purpose> SV_L (low temp. alarm SV) setting
<Operation> Input F02 and press SET key to display “-10” (initial value).
Set the value in the range “-05”~“-20” with ▲▲ key. Press SET key to store the value and revert to PV display.

F03: <Purpose> Battery accumulating time is displayed
<Operation> Input F03 and press SET key to display alternately F03 with “00.0” (in case battery used for a month or less). Press SET key to revert to PV display.

F04: <Purpose> Simply passing through if entered by mistake.
<Operation> Press SET key in “F04” displayed to revert to PV display.

F05: <Purpose> Compressor (H) / (L) is turned on with forcibly delayed (by minute increment) when the power retrieves from the power failure.
<Operation> Input “F05” and press SET key to display “002” (initial).
Change the value in the range “002”~”015” with ▲▲ key and ▶▶ key.
Press SET key to store the value and revert to PV display.

F06: <Purpose> Dividing F-code for customer used from service
<Operation> Input F06 and press SET key to display “000” (initial value).
Set to “384” with ▲▲ key and ▶▶ key. Press SET key to store the value and revert to PV display.
<Cancel> Input F06 and press SET key to display “384”.
Change to “000” with ▲▲ key and ▶▶ key. Press SET key to store the value and revert to PV display.
Turn the power off then on to revert to “000”. (not stored in non-volatile memory)
Note) “384” is storied in non-volatile memory during battery back-up. (battery SW is ON)

F07: <Purpose> To match controlled temperature of temp. sensor with temperature of center at the chamber.
<Operation> Input service code in F06 prior to use this mode.
Input F07 and press SET key to display “00.0” (initial value).
Change to the desired value in the range “-4.9”~”04.9” with ▲▲ key and ▶▶ key.
Press SET key to store the value and revert to PV display.

F08: <Purpose> To calibrate temperature of cascade sensor
<Operation> Input service code in F06 prior to use this mode.
Input F08 and press SET key to display “00.0” (initial value).
Change to the desire value in the range “-9.9”~”09.9” with ▲▲ key and ▶▶ key.
Press SET key to store the value and revert to PV display.

F12: <Purpose> To display the temperature of temp. sensor
<Operation> Input service code in F06 prior to use this mode.
Input F12 and press SET key to display alternately F12 and “XX.X” (present internal temperature). Press SET key to revert to PV display. 3 digits indication. Minus “-“ is not indicated.
Ex) “-85.5℃” → indicated as “85.5”

F13: <Purpose> To display the temperature of cascade sensor
<Operation> Input service code in F06 prior to use this mode.
Input F13 and press SET key to display alternately F13 and “XX.X” (present temperature of cascade sensor). Press SET key to revert to PV display.

F14: <Purpose> To display the temperature of filter sensor
<Operation> Input service code in F06 prior to use this mode.
Input F14 and press SET key to display alternately F14 and “XX.X” (present temperature of filter sensor). Press SET key to revert to PV display.

F15: <Purpose> To display the temperature of AT sensor
<Operation> Input service code in F06 prior to use this mode.
Input F15 and press SET key to display alternately F15 and “XX.X” (present temperature of AT sensor). Press SET key to revert to PV display.

F16: <Purpose> Simply passing through if entered by mistake.
<Operation> Press SET key in “F16” displayed to revert to PV display.

F17: <Purpose> Non-volatile memory initialization, model code change
<Operation> Service code should be input in F06 prior to use this mode.
Input F17 and press SET key to display “001”. Change the value with ⏫ key and ⏩ key. Press SET key to store and revert to PV display.
Model code ‘00X’: MDF-U5386S/U5386SC

F18: <Purpose> To turn capillary heater forcibly on (or off)
<Operation> Service code should be input in F06 prior to use this mode.
Input F18 and Press SET key to display “000” (initial).
Change to desire value “000” or “001” with ⏫ key and ⏩ key.
Press SET key to store the value and revert to PV display.
000: Capillary heater is turned on to off, or turned off to on
001: Capillary heater is forcibly turned off

F20: <Purpose> Simply passing through if entered by mistake.
<Operation> Press SET key in “F20” displayed to revert to PV display.

F21: <Purpose> Serial communication ID setting
<Operation> Input F21 and press SET key to display “000” (initial).
Change the value in the range “001”~”255” with ⏫ key and ⏩ key.

F22: <Purpose> Serial communication mode setting
<Operation> input F22 and press SET key to display “000” (initial value)
Change the value with ⏫ key and ⏩ key.
Press SET key to store the value and revert to PV display.
Control mode (the 3rd digit)
0: Local (initial)
1: Remote
Baud rate (the 2nd digit)
0: 2400bps (initial)
1: 4800bps
2: 9600bps
Note) You cannot be changed SV if control mode is set in “Remote”.

F24: <Purpose> To control remote alarm output
<Operation> Input F24 and Press SET key to display “000” (initial).
Change to the desired value with ▲▲ key and ▶▶key.
Press SET key to store the value and revert to PV display.
000: Remote alarm is outputted simultaneously with buzzer
001: Remote alarm is not outputted simultaneously with buzzer

F25: <Purpose> Alarm auto recovery time setting
<Operation> Input F25 and press SET key to display “030” (initial).
Change to the desired value with ▲▲ key and ▶▶key.
Press SET key to store the value and revert to PV display.
000: Auto recovery OFF
010: Recovers after 10min. passed
020: Recovers after 20min. passed
030: Recovers after 30min. passed (initial)
040: Recovers after 40min. passed
050: Recovers after 50min. passed
060: Recovers after 60min. passed

F26: <Purpose> Actual operation ratio is displayed (unit: %)
<Operation> Service code should be input in F06 prior to use this mode.
Input F26 and press SET key to display alternately F26 with “XXX” (present actual operation ratio).
Press SET key to revert to PV display.

F30: <Purpose> ROM version is displayed
<Operation> Service code should be input in F06 prior to use this mode.
Input F30 and press SET key to display alternately F30 with “X.XX” (present ROM version).
Press SET key to revert to PV display.

F31: <Purpose> Buzzer setting during filter alarm
<Operation> Input F31 and press SET key to display “001” (initial).
Change to the desired value with ▲▲ key and ▶▶key.
Press SET key to revert to PV display.
000: Buzzer off
001: Buzzer on

8. Differential (The point of compressor ON and OFF)

COMP ON: SV +0.4℃
COMP OFF: SV -1.2℃

9. Offset value

1) PV-2.0℃ is the offset value to adjust the difference between temperature of temp. sensor and the center of internal chamber.
2) PVat + (-3.0C) is the offset value to correct the ambient temperature.
*Note) PVat = Temperature of AT sensor

10. Remote alarm terminal

In normal condition: Remote alarm contact is N.O. N.C.
↓ ↓
In alarm condition & power failure : Remote alarm contact is N.C. N.O.

11. Cycling of High stage compressor

If the filter sensor is higher than or equal to 60℃, the High stage compressor will be turned off. When the filter sensor is within 10℃ of the ambient temperature sensor, the High stage compressor will be allowed to turn back on.

12. Sensor failure

(1) Temp. sensor

Open circuit: E01 and 50℃ are displayed alternately, the buzzer beeps intermittently and remote alarm contact outputs.
The compressor would be allowed to turn on.
Press BUZZER key to stop the buzzer beeping.

Short circuit: E02 and -170℃>PV>-180℃ are displayed alternately, the buzzer beeps intermittently and remote alarm contact outputs.
The compressor would be allowed to turn on.
Press BUZZER key to stop the buzzer beeping.

(2) Cascade sensor

Open circuited: E03 and PV are displayed alternately, the buzzer beeps intermittently and remote alarm contact outputs.
The resistance value would be ∞Ω and temperature would be -34.1℃ or lower. Compressor (L) is not forcibly turned off.
Press BUZZER key to stop the buzzer beeping.

Short circuited: E04 and PV are displayed alternately, the buzzer beeps intermittently and remote alarm contact outputs.
Press BUZZER key to stop the buzzer beeping.
The resistance value would be 0Ω and temperature would be -12℃ or higher that causes to be compressor (L) failure. Compressor (L) is forcibly turned off.

(3) Filter sensor

Open circuited: E05 and PV are displayed alternately, the buzzer beeps intermittently and remote alarm contact outputs.
Press BUZZER key to stop the buzzer beeping.

Short circuited: E06 and PV are displayed alternately, the buzzer beeps intermittently and remote alarm contact outputs.
Press BUZZER key to stop the buzzer beeping.

(4) AT sensor

Open circuited: E07 and PV are displayed alternately, the buzzer beeps intermittently and remote alarm contact outputs.
Press BUZZER key to stop the buzzer beeping.

Short circuited: E08 and PV are displayed alternately, the buzzer beeps intermittently and remote alarm contact outputs.
Press BUZZER key to stop the buzzer beeping.

(5) Error code priority

No.1: Temp. sensor failure (E01 or E02)
No.2: Cascade sensor failure (E03 or E04)
No.3: Filter sensor failure (E05 or E06)
No.4: AT sensor failure (E07 or E08)

(6) Standard to judge sensor failure

PT sensor:	49.9℃ or higher with E01 displayed (open circuited)
	-170℃ or lower with E02 displayed (short circuited)
Cascade sensor:	-60℃ or lower with E03 displayed (open circuited)
	60℃ or higher with E04 displayed (short circuited)
Filter sensor:	-60℃ or lower with E05 displayed (open circuited)
	130℃ or higher with E06 displayed (short circuited)
AT sensor:	-60℃ or lower with E07 displayed (open circuited)
	60℃ or higher with E08 displayed (short circuited)

13. Cycle to turn capillary heater on

Cycle: Every 18 hours

Period to turn on: 8 minutes (For factory use, unnecessary to change)

Capillary heater is permitted to turn on after 9seconds later since compressor L was switched to turn off.
With the compressor L keeps turning on for 60minutes, the compressor L turns off after 1minute passed then and capillary heater is forcibly turned on.

14. When the power is supplied (without battery)

Compressor H: Compressor H turns on with 2minutes (initial value) of delay after the power was supplied. Compressor H runs with regardless of PV.

Compressor L: In PV＞SV (when the cascade sensor temperature is -34.1℃ or lower), compressor L turns on with 2minutes (initial value) of delay after the power was supplied.
In PV＞SV (when the cascade sensor temperature is -34.0℃ or higher), compressor L turns on with 2minutes (initial value) of delay after the power was supplied and cascade temperature is reached at -34.1℃.

*Note) Delay time of both compressor H and L cannot be set individually.

Setting data: The setting data initialized in F17 is retrieved in non-volatile memory.

15. Other specifications

(1) Lamp specifications:

<Control PCB>

DP1: Orange lamp
Goes off: High/low temp. alarm, sensor failure, power failure
Lit : Not in alert condition

DP2: Green lamp
Goes off: Compressor L turns off. (normal condition)
Lit : Compressor L turns on.

DP3: Red lamp
Goes off: Capillary heater turns off. (normal condition)
Lit : Capillary heater turns on.

DP4: Yellow lamp
Goes off: Inoperative
Lit: Inoperative

DP6: Green lamp
Goes off: Compressor H turns off. (normal condition)
Lit : Compressor H turns on.

<Display PCB>

DP51: Red lamp
Goes off: Not in alarm condition (normal condition)
Blinks : High/low temp. alarm (without delay), or sensor failure, or power failure

DP52: Orange lamp
Goes off: Inoperative
Lit : Inoperative
Blinks : In F11 performed

DP53: Orange lamp
Goes off: Not in filter alarm (normal condition)
Lit : In filter alarm
Blinks : In F11 performed

DP54: Red lamp
Goes off: Inoperative
Lit : Inoperative
Blinks : In F11 performed

DP55: Orange lamp
Goes off: Length of battery used is 2.8yrs or less (normal condition)
Lit : Length of battery used is 2.8yrs or over
Blinks : In F11 performed

DP56: Green lamp
Goes off: Inoperative
Lit : Inoperative
Blinks : In F11 performed

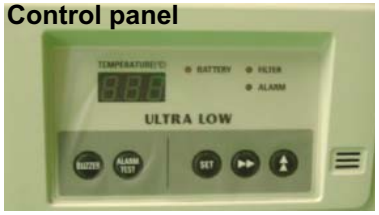
(2) Buzzer specifications:

High/low temp. alarm:	Intermittent tone emitted with delay
Sensor failure:	Intermittent tone emitted when EXX (XX=01~08) displayed
Power failure:	Intermittent tone emitted with DPA1 and DPA2 go off
Key quick:	Short tone emitted if available
Input out of range:	1second continuous tone emitted
Filter alarm:	Intermittent tone emitted with DP53 lit (in F31:001)
Compressor abnormal warming up :	Intermittent tone emitted with E10 displayed

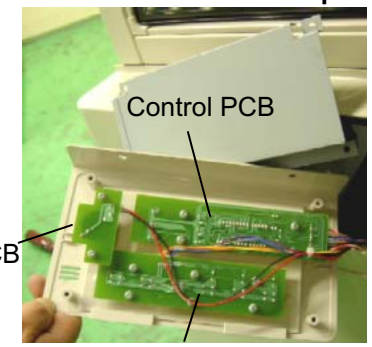
Parts layout

Door handle

Control panel



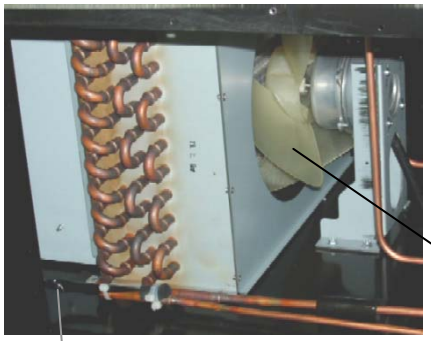
Reverse side of control panel



Control PCB

Buzzer PCB

Display PCB



Fan motor

Filter sensor

*MDF-U5386SC only

Boost BOX

Power transformer

Electrical BOX

Power supply couple
for MTR-85H

Expansion tank

Filter

AT sensor

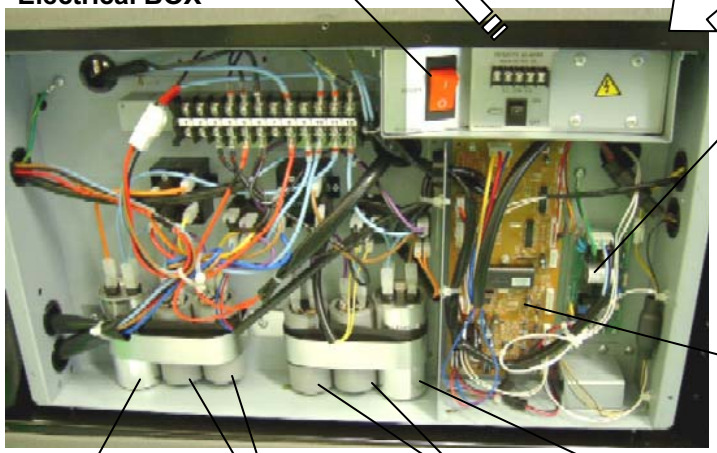
Corner cover

Remote alarm

Battery switch

Power switch

Electrical BOX



Battery

<NOTE>
When you replace with new battery;
BATTERY lamp does not go off unless you input '409' in F06.

Main PCB

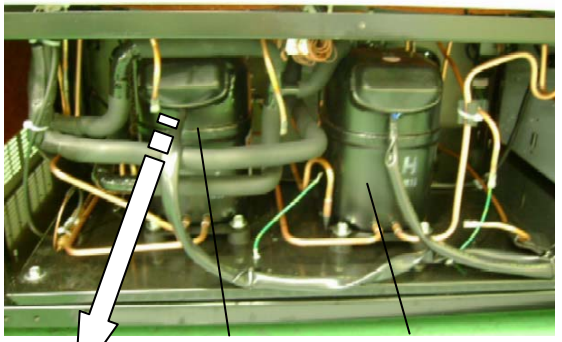
Running capacitor

Starting capacitor L

Starting capacitor H

Running capacitor H

Back view



Compressor L

Compressor H

<Covered>

Remove by screwdriver

<Cover opened>

Overload relay

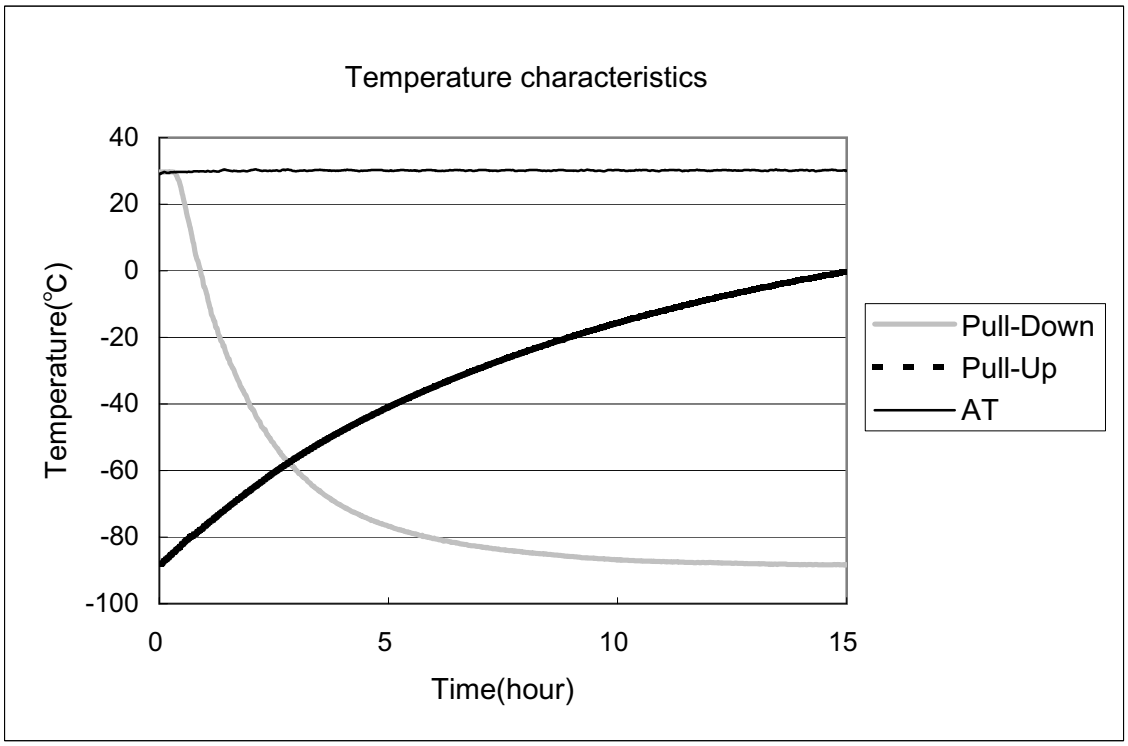
Sensor BOX

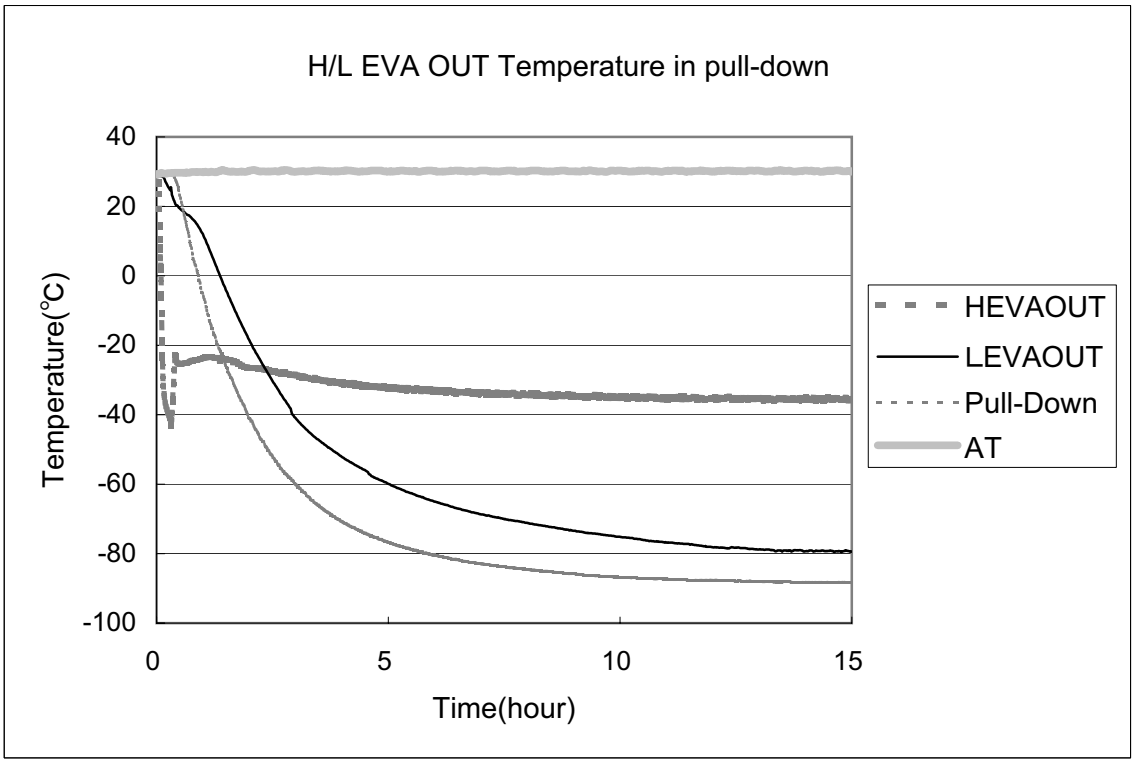
Noise filter

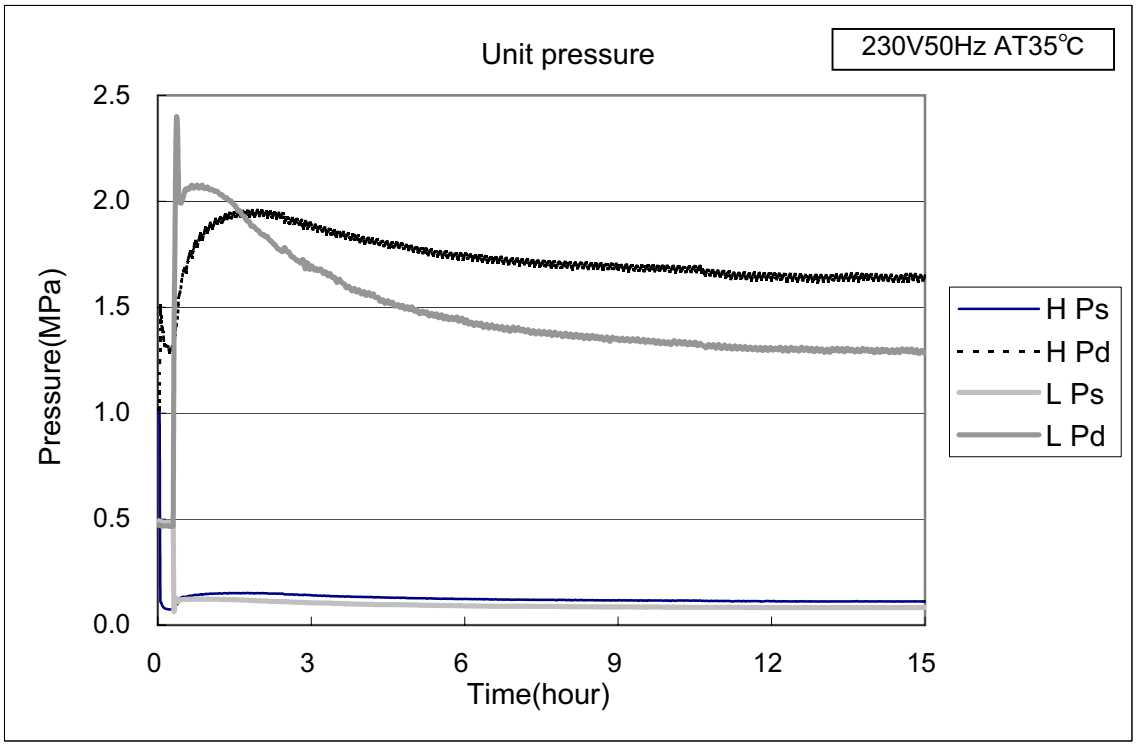
Test data

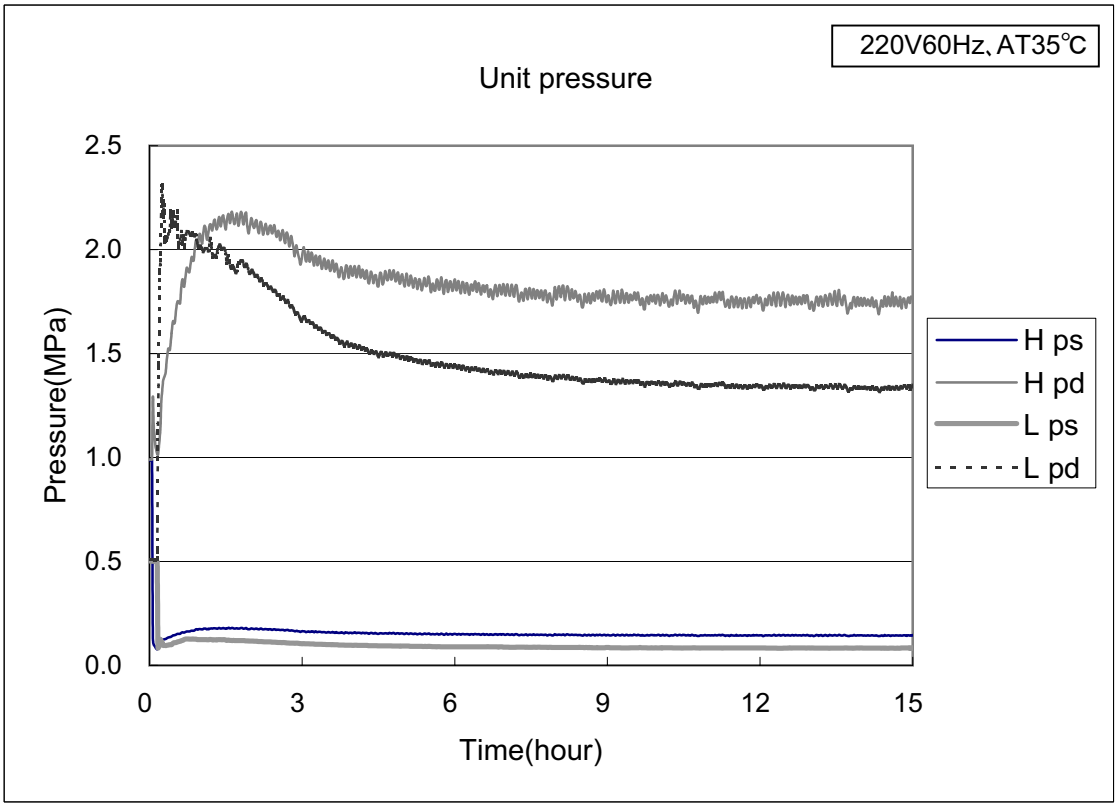
This is only an example of the measuring data, this does not assure the performance of the unit.

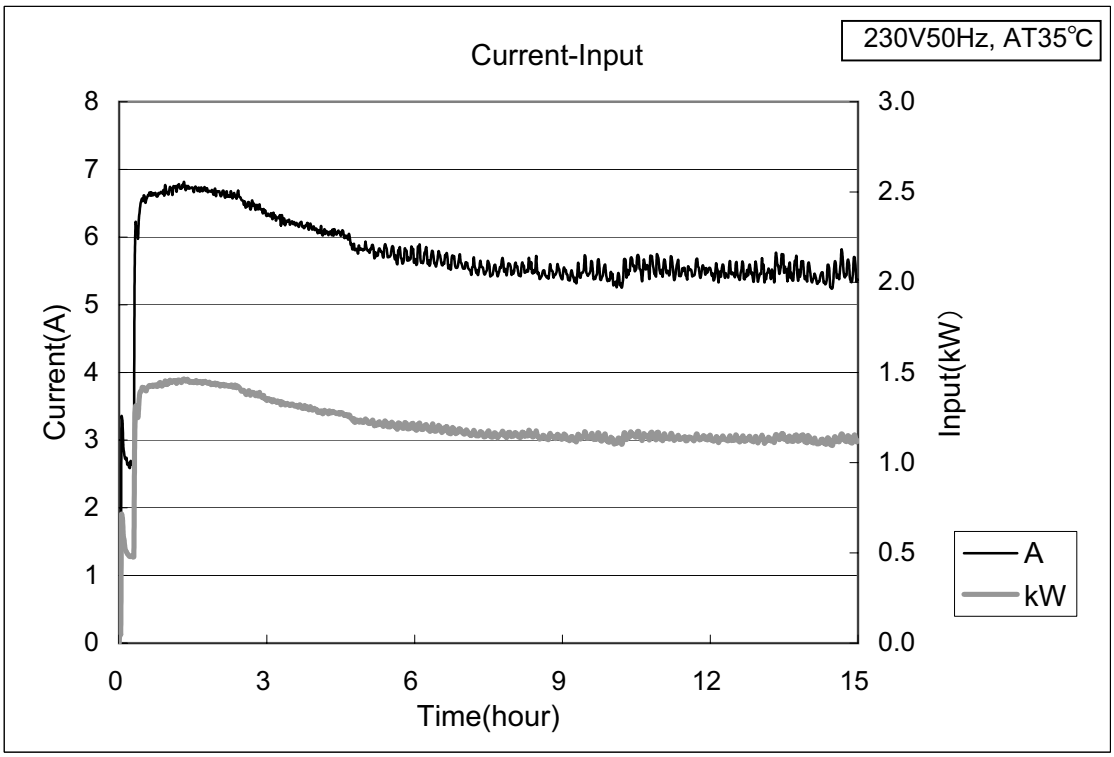
- Temperature characteristics
- H/L EVA OUT temperature in pull-down
- Unit pressure
- Current-input
- Chamber temperature uniformity
- Sample load test

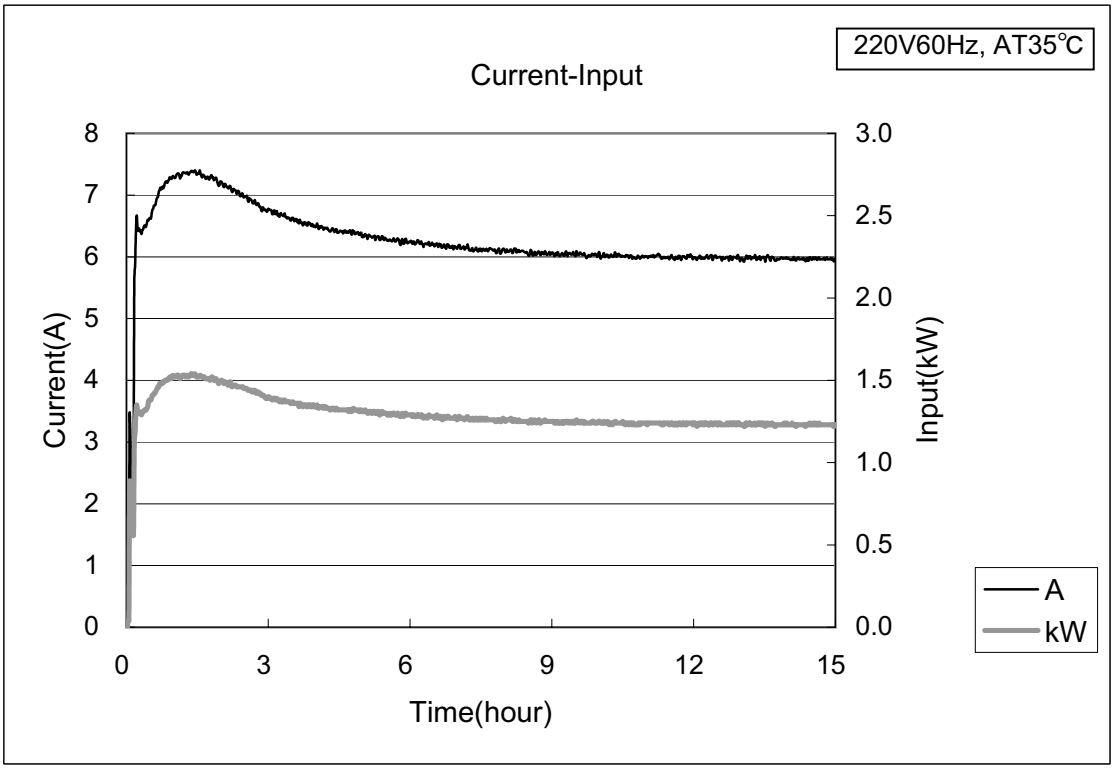

Temperature characteristics
40
20
0
-20
-40
-60
-80
-100
Temperature(°C)
0
5
10
15
Time(hour)
Pull-Down
Pull-Up
AT


H/L EVA OUT Temperature in pull-down
40
20
0
-20
-40
-60
-80
-100
Temperature(°C)
0
5
10
15
Time(hour)
HEVAOUT
LEVAOUT
Pull-Down
AT


Unit pressure
230V50Hz AT35℃
Pressure(MPa)
2.5
2.0
1.5
1.0
0.5
0.0
0
3
6
9
12
15
Time(hour)
H Ps
H Pd
L Ps
L Pd

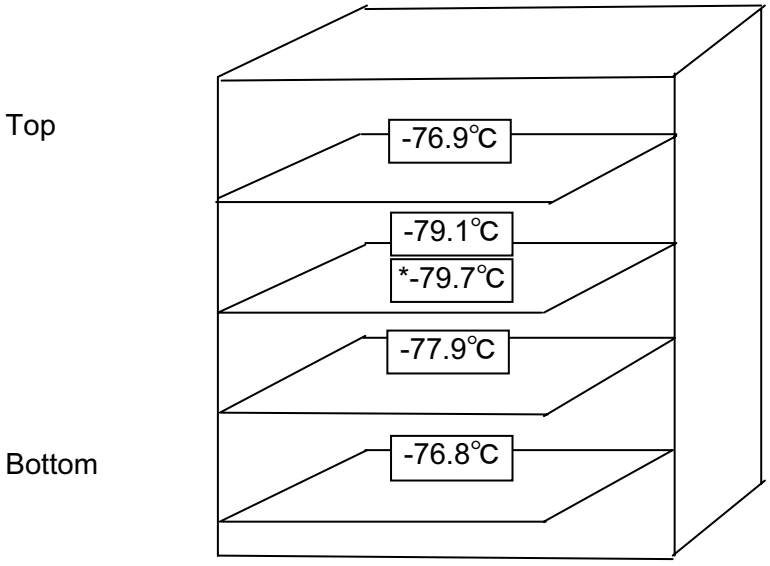

220V60Hz、AT35℃
Unit pressure
Pressure(MPa)
2.5
2.0
1.5
1.0
0.5
0.0
0
3
6
9
12
15
Time(hour)
H ps
H pd
L ps
L pd


230V50Hz, AT35℃
Current-Input
Current(A)
Input(kW)
Time(hour)
A
kW
0
1
2
3
4
5
6
7
8
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
3
6
9
12
15


220V60Hz, AT35℃
Current-Input
Current(A)
Input(kW)
Time(hour)
A
kW
0
1
2
3
4
5
6
7
8
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
3
6
9
12
15

Chamber Temperature Uniformity
～Reference～

Condition: SV-80℃
AT30℃
No load
Measuring point: Center



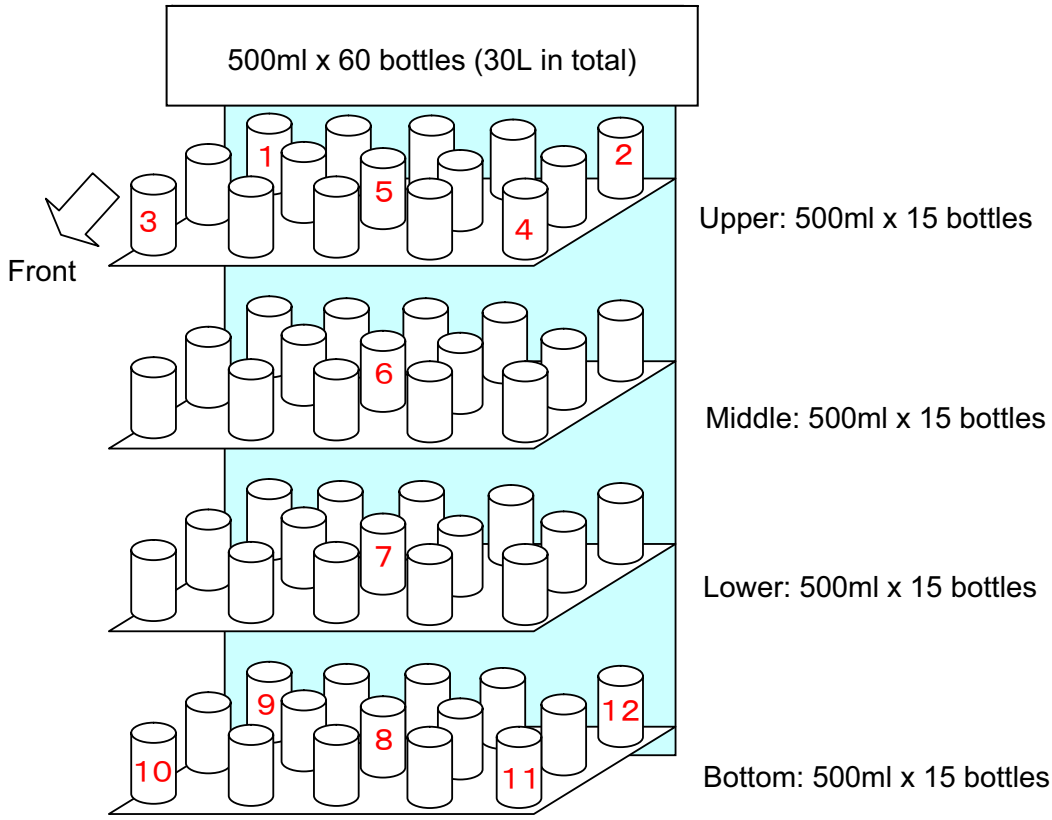
＊: 1/2H air

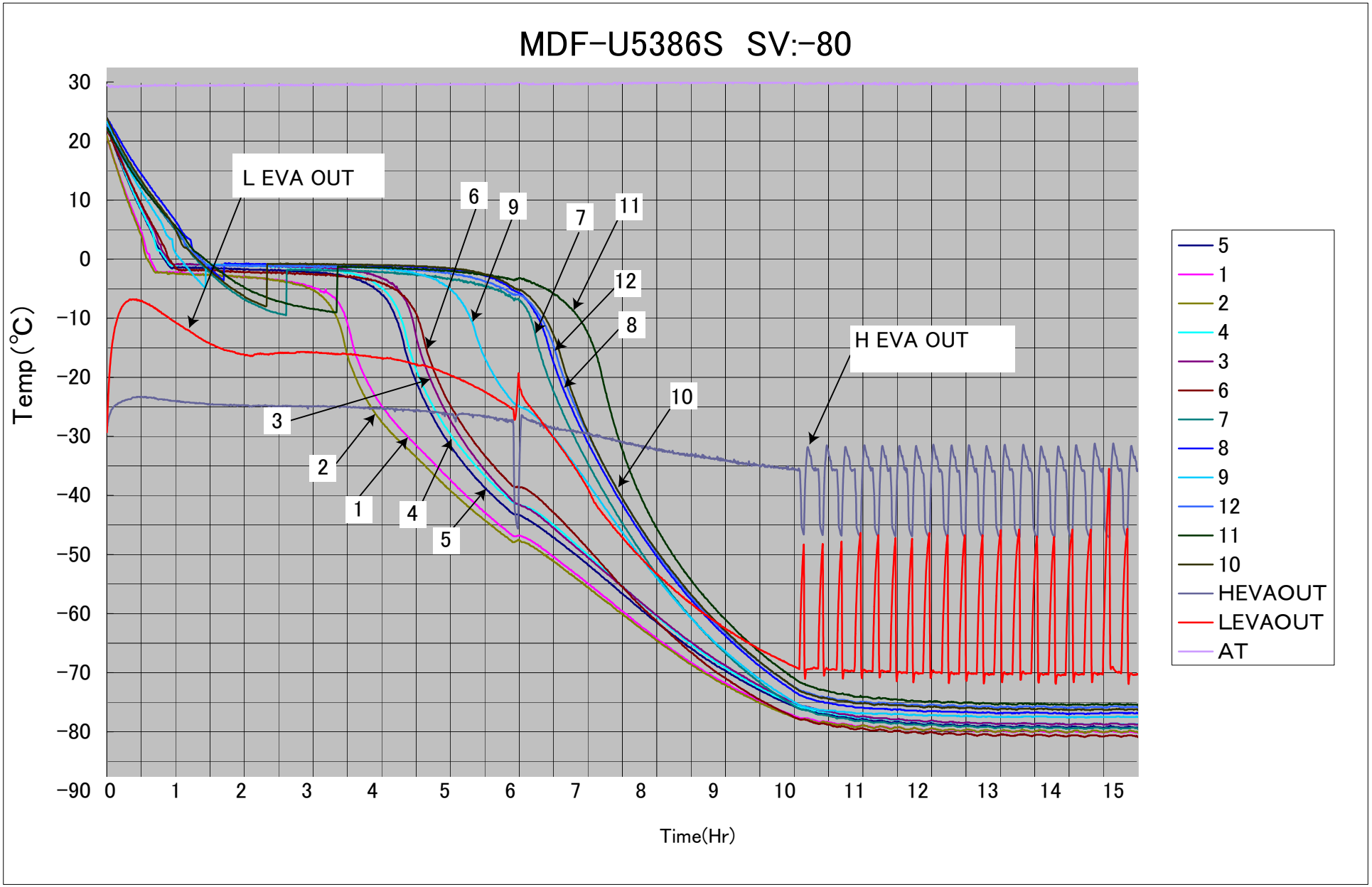
SAMPLE LOAD TEST

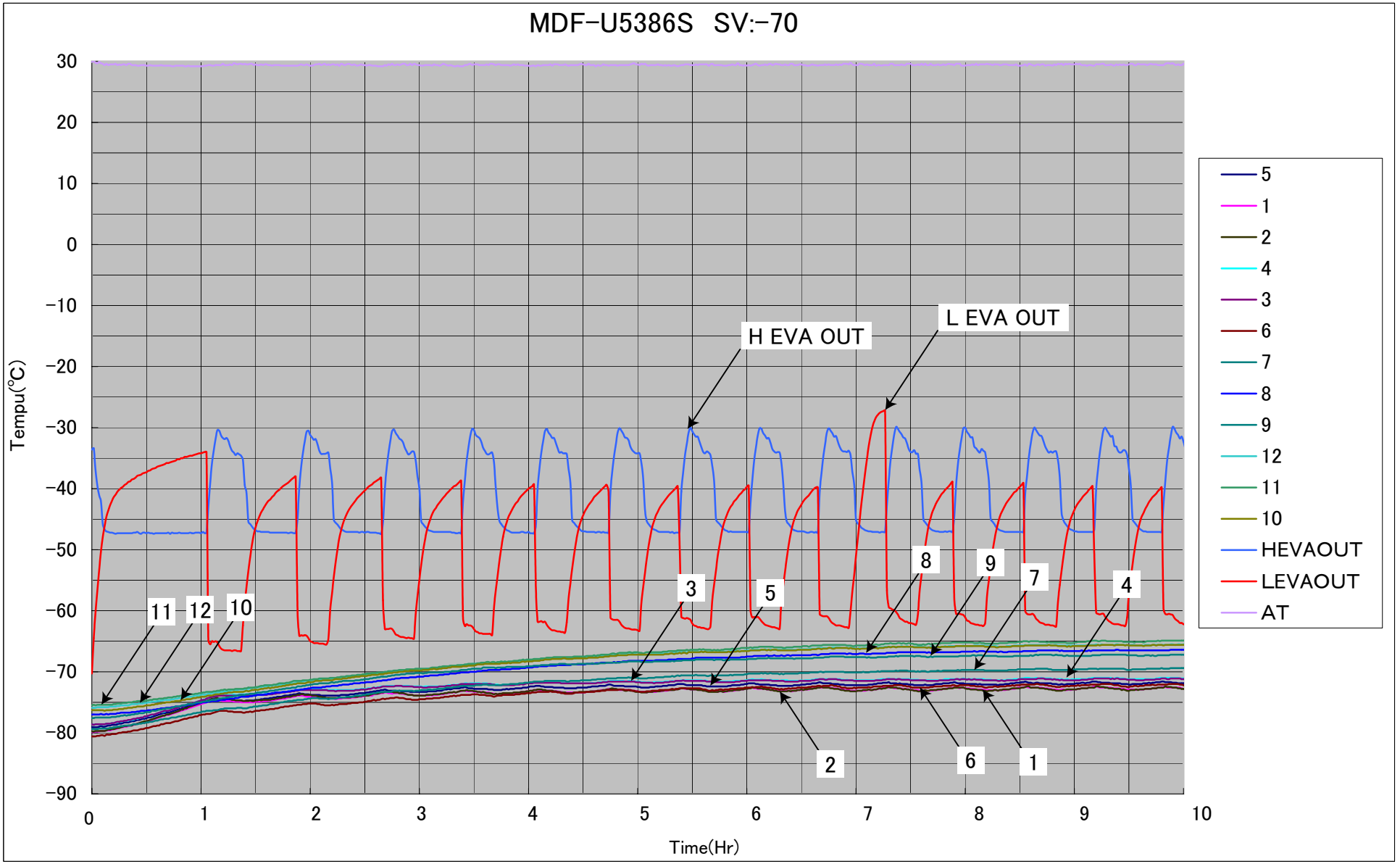
1. Layout for sample load

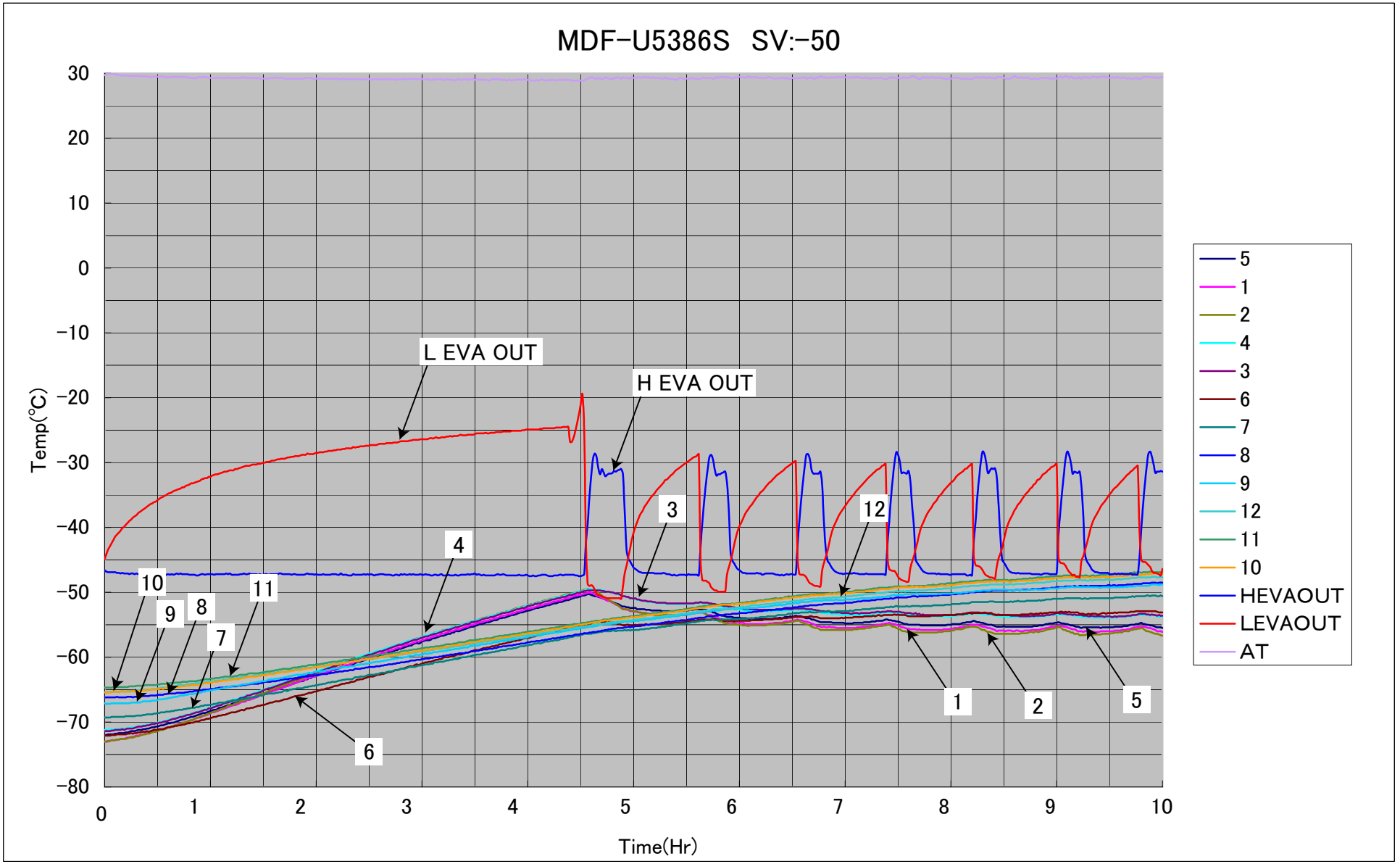
Test conditions: 500ml water x 60 bottles (30L water in total)

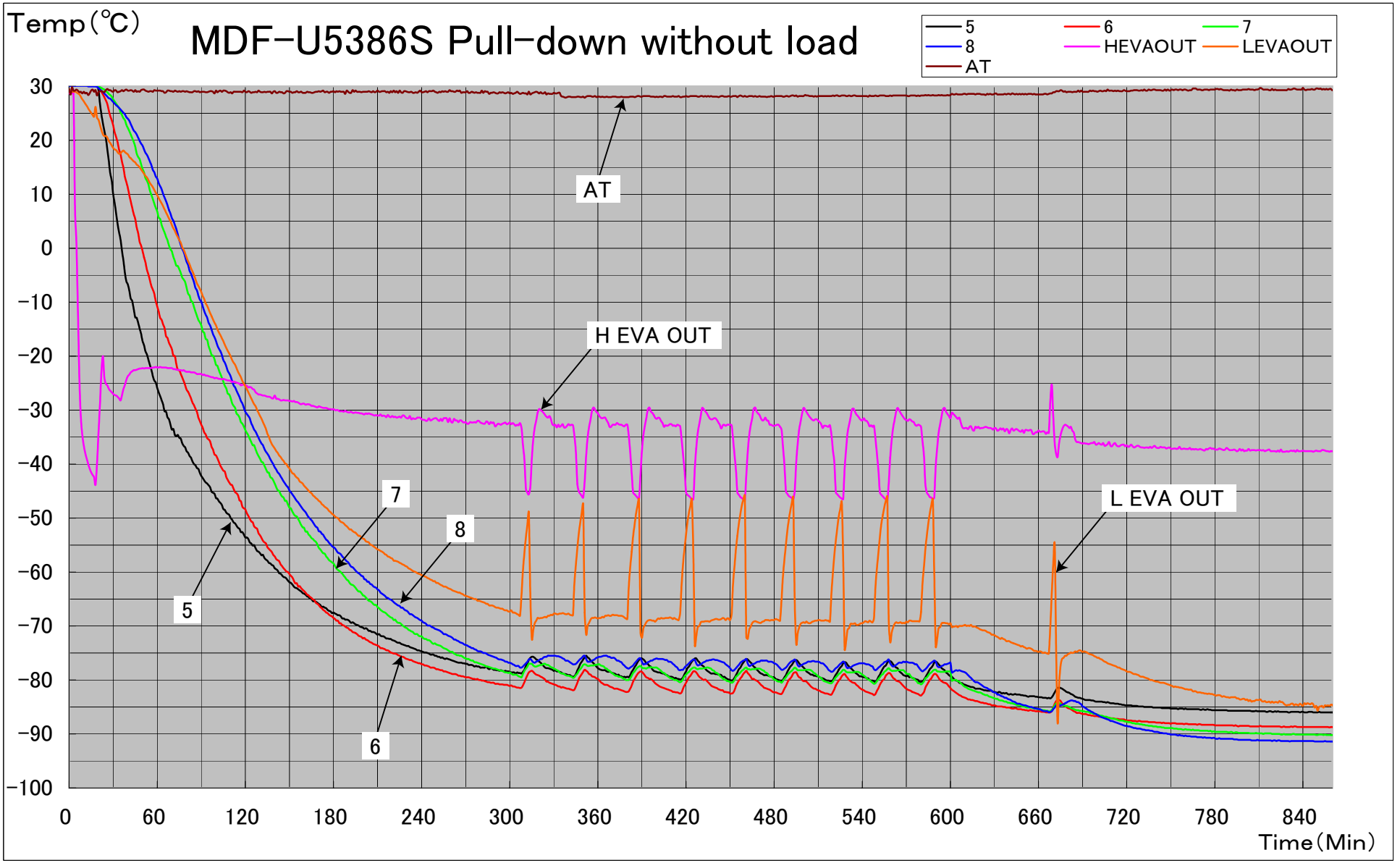
Measuring points 1~11 as the drawing shows.




MDF-U5386S SV:-80
Temp(℃)
Time(Hr)
L EVA OUT
H EVA OUT
1
2
3
4
5
6
7
8
9
10
11
12
5
1
2
4
3
6
7
8
9
12
11
10
HEVAOUT
LEVAOUT
AT


MDF-U5386S SV:-70
Tempu(℃)
Time(Hr)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
1
2
3
4
5
6
7
8
9
10
H EVA OUT
L EVA OUT
11
12
10
3
5
8
9
7
4
2
6
1
5
1
2
4
3
6
7
8
9
12
11
10
HEVAOUT
LEVAOUT
AT


MDF-U5386S SV:-50
Temp(℃)
Time(Hr)
L EVA OUT
H EVA OUT
1
2
3
4
5
6
7
8
9
10
11
12
5
1
2
4
3
6
7
8
9
12
11
10
HEVAOUT
LEVAOUT
AT


Temp(℃)
MDF-U5386S Pull-down without load
5
6
7
8
HEVAOUT
LEVAOUT
AT
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
60
120
180
240
300
360
420
480
540
600
660
720
780
840
Time(Min)
AT
H EVA OUT
L EVA OUT
5
6
7
8

Instruction manual

・ This section is extracted and printed from Instruction Manual.

・ If you find out “Refer to page ●●” in them, this page means not page in service manual but page in the lower corner of each page in the extract from Instruction manual.
This page number is not corresponded with serial number in Service manual.

SANYO

INSTRUCTION MANUAL

Ultra-Low Temperature Freezer

MDF-U7386S
MDF-U7386SC
MDF-U5386S
MDF-U5386SC

MDF-U7386S

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INTRODUCTION

■ Read this manual carefully before using the appliance and follow the instructions for safety operation.

■ Sanyo never guarantee any safety if the appliance is used for any objects other than intended use or used by any procedures other than those mentioned in this manual.

■ Keep this manual in an adequate place to refer to it as necessary.

■ The contents of the manual will be subjected to change without notice due to the improvement of performance or functions.

■ Contact Sanyo sales representative or agent if any page of the manual is lost or page order is incorrect.

■ Contact Sanyo sales representative or agent if any point in this manual is unclear or if there are any inaccuracies.

■ No part of this manual may be reproduced in any form without the expressed written permission of Sanyo.

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user complies with this manual as it contains important safety advice.

Items and procedures are described so that you can use this unit correctly and safely. If the precautions advised are followed, this will prevent possible injury to the user and any other person.

Precautions are illustrated in the following way:

⚠WARNING

Failure to observe WARNING signs could result in a hazard to personnel possibly resulting in serious injury or death.

⚠CAUTION

Failure to observe CAUTION signs could result in injury to personnel and damage to the unit and associated property.

Symbol shows;

△ this symbol means caution.

⃠ this symbol means an action is prohibited.

● this symbol means an instruction must be followed.

Be sure to keep this manual in a place accessible to users of this unit.

< Label on the unit >

This mark is labeled on the cover in which the electrical components of high voltage are enclosed to prevent the electric shock.

The cover should be removed by a qualified engineer or a service personnel only.

⚠WARNING

As with any equipment that uses CO_2 gas, there is a likelihood of oxygen depletion in the vicinity of the equipment. It is important that you assess the work site to ensure there is suitable and sufficient ventilation. If restricted ventilation is suspected, then other methods of ensuring a safe environment must be considered. These may include atmosphere monitoring and warning devices.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Only qualified engineers or service personnel should install the unit. The installation by unqualified personnel may cause electric shock or fire.

Install the unit on a sturdy floor and take an adequate precaution to prevent the unit from turning over. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

Never install the unit in a flammable or volatile location. This may cause explosion or fire.

Never install the unit where acid or corrosive gases are present as current leakage or electric shock may result due to corrosion.

Always ground (earth) the unit to prevent electric shock. If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

Connect the unit to a power source as indicated on the rating label attached to the unit. Use of any other voltage or frequency other than that on the rating label may cause fire or electric shock.

Never store volatile or flammable substances in this unit if the container cannot be sealed. These may cause explosion or fire.

Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet on the unit. This may cause electric shock or injury by accidental contact with moving parts.

Use this unit in safe area when treating the poison, harmful or radiate articles. Improper use may cause bad effect on your health or environment.

Turn off the power switch (if provided) and disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand. This may cause electric shock.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Never splash water directly onto the unit as this may cause electric shock or short circuit.

Never put containers with liquid on the unit as this may cause electric shock or short circuit when the liquid is spilled.

Never bind, process, or step on the power supply cord, or never damage or break the power supply plug. A broken supply cord or plug may cause fire or electric shock.

Do not use the supply cord if its plug is loose. Such supply cord may cause fire or electric shock.

Never disassemble, repair, or modify the unit yourself. Any such work carried out by an unauthorized person may result in fire, or electric shock or injury due to a malfunction.

Disconnect the power supply plug if there is something wrong with the unit. Continued abnormal operation may cause electric shock or fire.

When removing the plug from the power supply outlet, grip the power supply plug, not the cord. Pulling the cord may result in electric shock or fire by short circuit.

Disconnect the power supply plug before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.

Disconnect the power plug when the unit is not used for long periods. Keeping the connection may cause electric shock, current leakage, or fire due to the deterioration of insulation.

If the unit is to be stored unused in an unsupervised area for an extended period, **ensure that children do not have access and that doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Remove doors to prevent accidents such as suffocation.

Do not put the packing plastic bag within reach of children as suffocation may result.

PRECAUTIONS FOR SAFE OPERATION

⚠CAUTION

Use a dedicated power source (a dedicated circuit with a breaker) as indicated on the rating label attached to the unit. A branched circuit may cause fire resulting from abnormal heating.

Connect the power supply plug to the power source firmly after removing the dust on the plug. A dusty plug or improper insertion may cause a heat or ignition.

Never store corrosive substances such as acid or alkali in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.

Check the setting when starting up of operation after power failure or turning off of power switch. The stored items may be damaged due to the change of setting.

Be careful not to tip over the unit during movement to prevent damage or injury.

Prepare a safety check sheet when you request any repair or maintenance for the safety of service personnel.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC-1010-1):

■ Indoor use;

■ Altitude up to 2000 m;

■ Ambient temperature 5°C to 40°C

■ Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C;

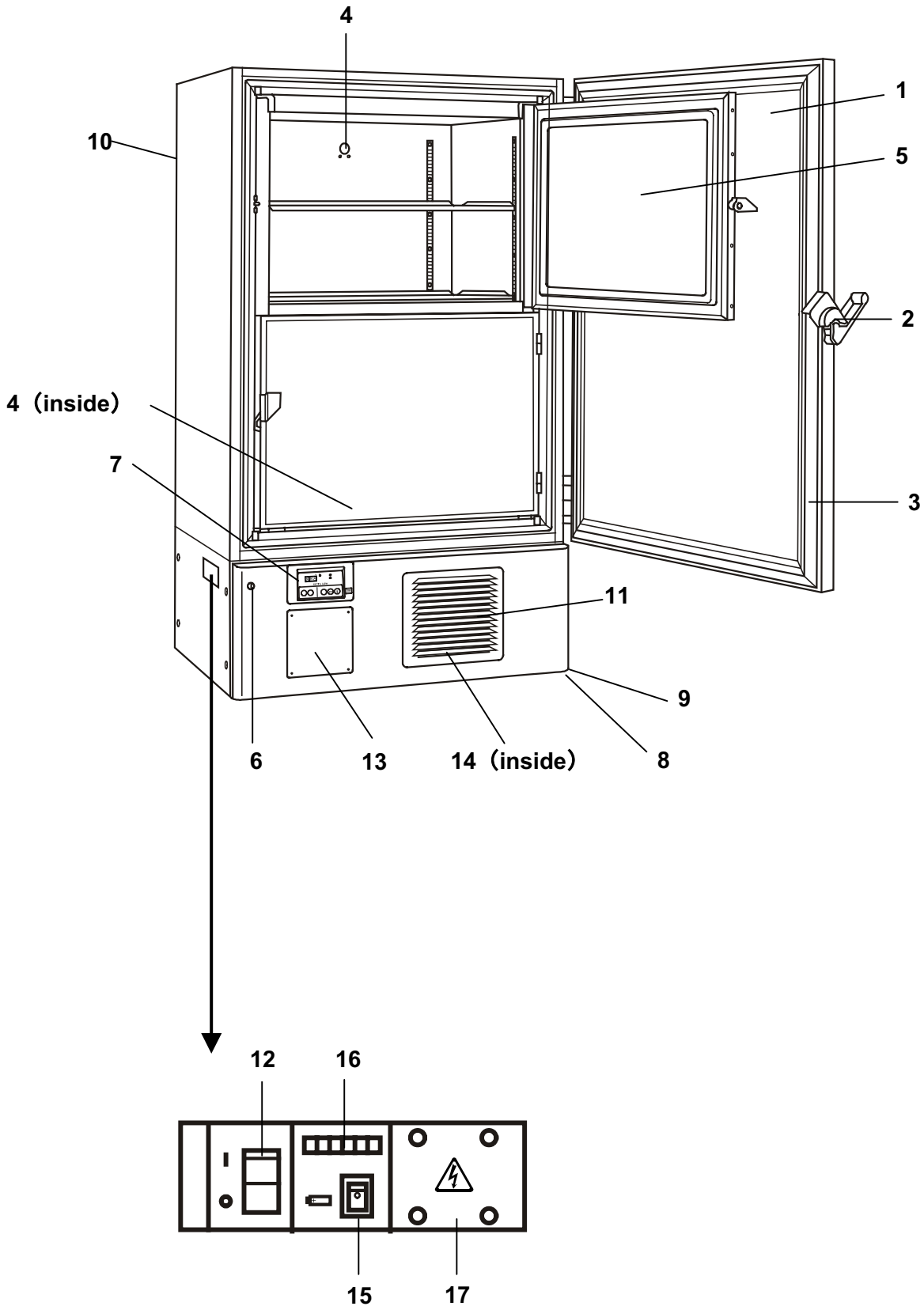
■ Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage;

■ Other supply voltage fluctuations as stated by the manufacturer;

■ Transient overvoltages according to Installation Categories (Overvoltage Categories) II; For mains supply the minimum and normal category is II;

■ Pollution degree 2 in accordance with IEC 664.

FREEZER COMPONENTS



FREEZER COMPONENTS

1. Outer door: To open the door, grip the handle. On closing, lock the door latch completely.

2. Door latch: Always lock the latch when the outer door is closed.

3. Magnetic door gasket: This provides a tight door seal and prevents cold air leak. Keep clean.

4. Access port (rear and bottom): This is used for leading a cable and sensor of a measuring equipment, or nozzle of back-up system to chamber.

5. Inner door: The operation of the inner door should be quick to minimize the temperature rise in chamber. Lock the door latch completely when the door is closed. The door is removable for cleaning or defrosting. See page 21 “Routine maintenance”.

6. Lock: Turn clockwise to 180^{o} with a key and the outer door is securely locked.

7. Control panel: Used for temperature setting and indication of operating status is displayed on the panel. See page 10 for details.

8. Caster: 4 casters are provided to facilitate moving of the cabinet. For the installation, adjust the leveling foot so that the front 2 casters cannot contact with the floor.

9. Leveling foot: The height of the freezer can be adjusted by this screw type foot. Keep the unit in level at the installation.

10. Fixture (on back side): 2 fixtures serve as spacers between the cabinet and wall and also serve as hooks to fix the unit. See page 12 “Installation”.

11. Air intake vent (grille): Do not block this vent to keep the proper cooling performance.

12. Power switch: This is for turning ON/OFF the power to the unit. ON – “I” OFF – “O”

13. Space for temperature recorder: An automatic temperature recorder (optional component) can be attached here. See page 25 “Temperature recorder”.

14. Condenser filter (behind the grille): This filter prevents the dust from accumulating on the condenser. The dusty filter may cause failure of refrigerating device. Clean the filter once a month. See page 20 “Routine maintenance” for the cleaning.

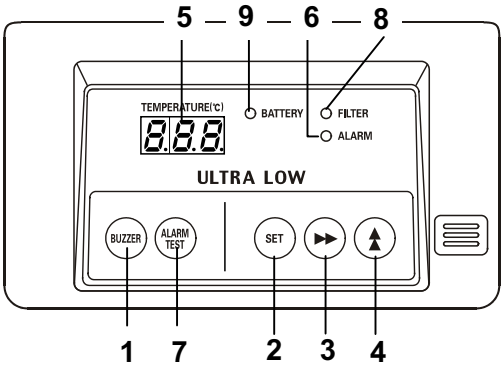
15. Battery switch: This is a switch for a battery for power failure alarm. Normally, turn on this switch. Be sure to turn off this switch if the freezer is not in operating for the long period.

16. Remote alarm terminal: This is used to notice an alarm condition of the unit to remote location. Refer to page 18 “Remote alarm terminal”.

17. Space for optional component:

FREEZER COMPONENTS

Control panel and keypad



1. Buzzer stop key (BUZZER): To silence the audible alarm under alarm condition, press this key. The buzzer during alarm test cannot be silenced by this key.

2. Set key (SET): Temperature setting mode is led by pressing this key and the changeable digit is flashed. By pressing this key again, the setting is memorized. The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. Refer to page 14 for details.

3. Digit shift key (▶▶): Pressing this key in the setting mode causes the changeable digit to shift. Key lock is available by pressing this key for more than 5 seconds in the temperature display mode. Refer to page 14 for details.

4. Numerical value shift key (▲): Pressing this key in the setting mode causes the numerical value to shift. "ON-OFF" of key lock can be selected by pressing this key in the key lock mode. By pressing this key for more than 5 seconds in the temperature display mode leads setting mode for alarm temperature and alarm resume time. Refer to page 15 and 17 for details respectively.

5. Digital temperature indicator: This indicator shows the present chamber temperature or set temperature.

6. Alarm lamp (ALARM): This lamp is flashed during alarm condition.

7. Alarm test key (ALARM TEST): To check the alarm system. Pressing this key with the battery switch ON gets the alarm lamp to flash, the remote alarm to operate, and the buzzer to sound.

8. Filter check lamp (FILTER): This lamp lights when the excessive dust is accumulated on the condenser filter. When this lamp lights, clean the condenser filter following the procedure on page 20.

9. Battery check lamp (BATTERY): This lamp flickers to recommend the battery replacement. For the replacement, consult Sanyo sales representative or agent.

INSTALLATION SITE

To operate this unit properly and to obtain maximum performance, install the unit in a location with the following conditions:

1. A location not subjected to direct sunlight

Installation in a location subjected to direct sunlight may lead to inadequate cooling.

2. A location with adequate ventilation

Leave at least 10 cm around the unit for ventilation. Poor ventilation will result in a reduction of the refrigeration capacity.

3. A location away from heat generating sources

Avoid installing the unit near heat-emitting appliances such as gas ranges or stoves. Heat can cause inefficient refrigeration.

4. **A location not prone to high humidity**

> ⚠ **WARNING**
>
> **Install the unit on a sturdy floor.** If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.
>
> **Select a level and sturdy floor for installation.** This precaution will prevent the unit from tipping. Improper installation may result in water spillage or injury from the unit tipping over.

▪ **A location not prone to high humidity**

> ⚠ **WARNING**
>
> **Do not use the unit outdoors.** Current leakage or electric shock may result if the unit is exposed to rain water.
>
> **Never install the unit in a humid place or a place where it is likely to be splashed by water.** Deterioration of the insulation may result which could cause current leakage or electric shock.

▪ **A location without flammable or corrosive gas**

> ⚠ **WARNING**
>
> **Never install the unit in a flammable or volatile location.** This may cause explosion or fire.
>
> **Never install the unit where acid or corrosive gases are present** as current leakage or electric shock may result due to corrosion.

INSTALLATION

1. Remove the packaging materials and tapes

Remove all transportation packaging materials and tapes. Open the doors and ventilate the unit. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the panels with a dry cloth.

2. Adjust the leveling foot

Extend the leveling feet by rotating them counterclockwise to contact them to the floor. Ensure the unit is level. (Fig.1)

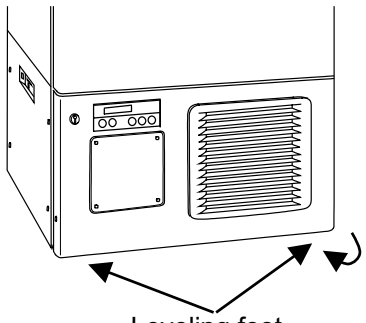


Fig.1

3. Fix the unit

Two fixtures are attached to the rear of the frame. Fix the frame to the wall with these fixtures and rope or chain. (Fig.2)

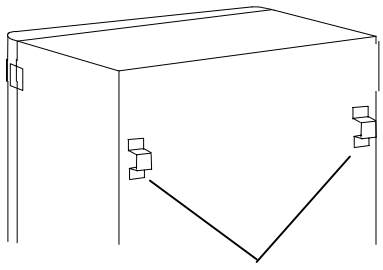


Fig.2

4. Ground (earth)

⚠WARNING

Use a power supply outlet with ground (earth) to prevent electric shock. If the power supply outlet is not grounded, it is necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

START-UP OF UNIT

Follow the procedures for the initial and consequent operations of the unit.

1. Connect the power cord to the dedicated outlet having appropriate rating with the chamber empty, and turn on the power switch on the freezer.

2. Turn off the switch of the back-up system (optional component) if it is installed.

3. Check that the battery switch is ON.

4. The audible alarm may activated. In this case, press the buzzer stop key (BUZZER) to silence the alarm.

5. Set the desired chamber temperature. See page 14 for the temperature setting.

6. Check that the chamber temperature reaches the desired temperature.

7. Turn on the switch of back-up system (optional component) if it is installed.

8. Check that the alarm lamp lights and the buzzer sounds by pressing the alarm test key.

9. After confirming the above, you can put articles into the freezer chamber in a small batch to prevent the temperature rise.

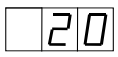
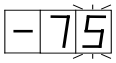
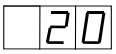
TEMPERATURE SETTING

Chamber temperature

Table 1 shows the basic procedure for setting the chamber temperature. Perform key operations in the sequence indicated in the table. The example in the table is based on the assumption that the desired temperature is -75°C.

Note: The unit is set at the factory that the chamber temperature -80°C.

Table 1. Basic operation sequence (Example: Chamber temperature -75°C)

	Description of operation	Key operated	Indication after operation
1	Turn the power switch ON.	----	The current chamber temperature is displayed. 
2	Press SET key.	SET	The second digit is flashed.
3	Set to -75 with the numerical value shift key and digit shift key.	▲▲	When pressed, the figure of settable digit changes.
		▶▶	When pressed, the settable digit is shifted. 
4	Press SET key.	SET	Set temperature is memorized and the current chamber temperature is displayed. 

Note:

• The temperature set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation.

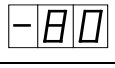
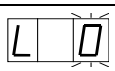
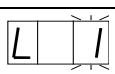
• Although the value of the chamber temperature setting can range from -50°C to -90°C, the guaranteed temperature when there is no load is -85°C when the ambient temperature is 30°C.

Key lock function

This unit is provided with the key lock function. When the key lock is ON, change of temperature setting through the key pad is not available. The key lock is set in OFF at the factory.

Display	Mode	Function
L 0	Key lock is OFF	Enable to change of temperature setting
L 1	Key lock is ON	Disable to change of temperature setting

Table 2. Procedure for key lock setting (change from key lock OFF to key lock ON)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed. 
2	Press digit shift key for 5 seconds.	▶▶	The first digit is flashed. 
3	Press numerical value shift key and scroll the figure to 1.	▲▲	When pressed, the figure of settable digit changes. 
4	Press SET key.	SET	The key lock is set to ON. The current chamber temperature is displayed.

ALARM TEMPERATURE SETTING

This unit is provided with the high and low temperature alarm and the temperature at which the alarm is activated is changeable.

The following procedure shows the setting of alarm temperature according to the condition below:

High temperature alarm: activates at the temperature 5°C higher than the set temperature

Low temperature alarm: activates at the temperature 5°C lower than the set temperature

Note:

The alarm temperature is set at the factory 10°C higher and lower than the set temperature.

The available range of alarm temperature is between 5°C and 20°C higher or lower than the set temperature.

Table 3. Procedure for setting high temperature alarm

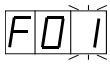
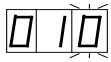
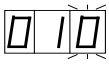
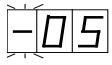
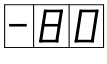
	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for about 5 seconds.	▲▲	The first digit is flashed.
3	Press numerical value shift key and scroll the figure to 1.	▲▲	The first digit is flashed. 
4	Press SET key.	SET	The first digit is flashed. 
5	Scroll the figure to 005 by using digit shift key and numerical value shift key	▲▲	When pressed, the figure of settable digit changes.
		▶▶	When pressed, the changeable digit moves.
6	Press SET key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed.

Table 4. Procedure for setting low temperature alarm

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for about 5 seconds.	▲▲	The first digit is flashed.
3	Press numerical value shift key and scroll the figure to 2..	▲▲	The first digit is flashed.
4	Press SET key.	SET	The first digit is flashed. 
5	Scroll the figure to -05 by using digit shift key and numerical value shift key	▲▲	When pressed, the figure of settable digit changes.
		▶▶	When pressed, the changeable digit moves. 
6	Press SET key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed. 

ALARMS & SAFETY FUNCTIONS

This unit has the alarms and safety functions shown in Table 5, and also self diagnostic functions.

Table 5. Alarms and safety functions

Alarm & Safety	Situation	Indication	Buzzer	Safety operation
High temperature alarm	If the chamber temperature is higher than the temperature at which the high temperature alarm is activated.	ALARM lamp is flashed. Temperature indicator is flashed.	Intermittent tone with 15 minutes delay.	Remote alarm with 15 minutes delay.
Low temperature alarm	If the chamber temperature is lower than the temperature at which the low temperature alarm is activated.			
Power failure alarm	When the power to the unit is disconnected.	ALARM lamp is flashed.	Intermittent tone	Remote alarm.
Filter check	When the condenser filter is clogged.	Filter check lamp lights.	-----	-----
Battery check	When about 2.8 years has passed with power switch ON.	Battery check lamp lights.	-----	-----
Auto-return	When there is no key pressing in each setting mode for 90 seconds.	Chamber temperature is displayed.	-----	Finishing of each setting mode.
Key lock	When the key lock is “ON”.	-----	-----	Change of setting is disable.
Sensor abnormality	If the thermal sensor is disconnected.	ALARM lamp is flashed. E01 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Unit keeps continuous running.
	If the thermal sensor is short-circuited.	ALARM lamp is flashed. E02 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Unit keeps continuous running.
	If the cascade sensor is disconnected.	ALARM lamp is flashed. E03 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the cascade sensor is short circuited.	ALARM lamp is flashed. E04 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the filter sensor is disconnected.	ALARM lamp is flashed. E05 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the filter sensor is short-circuited.	ALARM lamp is flashed. E06 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Battery switch check	When the battery switch is OFF during alarm test.	ALARM lamp is flashed. E09 is flashed.	-----	-----

Note:

• When the operation is started in high ambient temperature, the filter check lamp is sometimes flashed. In this case, the lamp is off automatically when the chamber temperature is getting lower.

• The freezer resumes the operation after power failure with the temperature setting before power failure as the chamber temperature setting and alarm temperature setting are memorized in the volatile memory.

• The chamber temperature is displayed for 5 seconds by pressing BUZZER key during power failure alarm. Then the buzzer is silenced. The ALARM lamp keeps flashing.

SETTING OF ALARM RESUME TIME

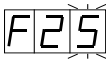
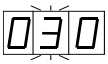
The alarm buzzer is silenced by pressing BUZZER key on the control panel during alarm condition (The remote alarm is not silenced).

The buzzer will be activated again after certain suspension if the alarm condition is continued. The suspension time can be set by following the procedure shown in the Table 6 below.

The example in the table is based on the assumption that the desired duration is 20 minutes.

Note: The duration is set in 30 minutes at the factory.

Table 6. Setting procedure for alarm resuming time (change from 30 minutes to 20 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press digit shift key for 5 seconds.		The first digit is flashed.
3	Set the figure to F25 with the digit shift key and numerical value shift key.		The settable digit is shifted.
			When pressed, the figure of settable digit changes. 
4	Press SET key.	SET	The current reset time is displayed. The middle digit is flashed. 
5	Set the figure to 020 with the numerical value shift key.		When pressed, the figure of settable digit changes.
6	Press SET key.	SET	The setting is memorized and the current chamber temperature is displayed.

• The settable alarm resume time is 10, 20, 30, 40, 50, or 60 minutes (The setting is 010, 020, 030, 040, 050, or 060). The buzzer would not reset if the reset time is set in 000.

• It is recommended to set the alarm resume time when the freezer is not under alarm condition. The setting during alarm condition is effective on the next alarm condition.

• The setting cannot be changed during power failure.

• The remote alarm during power failure or buzzer and remote alarm during alarm test cannot be silenced.

• The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing SET key is not memorized.

REMOTE ALARM TERMINAL

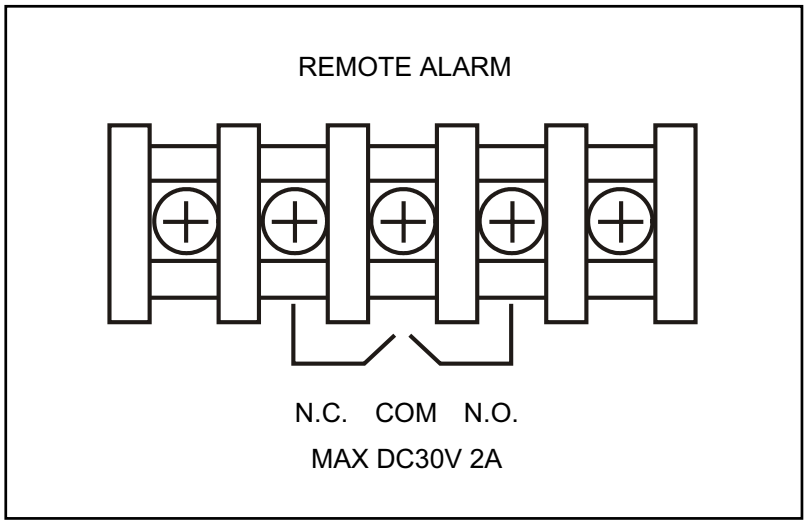
The terminal of the remote alarm is installed at the lower left side of the unit. The alarm is outputted from this terminal. Contact capacity is DC 30V, 2 A.

Contact output:

	between COM. and N.O.	between COM. and N.C.
At normal	Open	Close
At abnormal	Close	Open

Note:

The alarm is actuated when the power cord is disconnected from the outlet or the power switch is OFF.



CHANGE OF COMPRESSOR DELAY TIME

The delay time of high and low stage side compressor can be changed to reduce the load on the power line and to facilitate the start-up (reset) of the freezer after power failure.

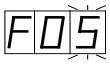
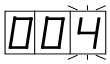
The example in the table is based on the assumption that the delay time is changed to 4 minutes.
(The delay time is set in 2 minutes at the factory.)

Note:

• The delay time should be the same for high stage side and low stage side compressors.

• The setting range for delay time is between 2 and 15 minutes. The cool down of chamber temperature may be slow when the setting of delay time is over 5 minutes, depending on the installation environment. There is no need of changing the delay time when the capacity of power source is adequate.

Table 8. Changing procedure for delay time (change from 2 minutes to 4 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.	▲▲	The first digit is flashed.
3	Set the figure to F05 with the numerical value shift key.	▲▲	When pressed, the figure of settable digit changes. 
4	Press SET key.	SET	The current delay time is displayed. The first digit is flashed.
5	Set the figure to 004 with the numerical value shift key.	▲▲	When pressed, the figure of the first digit changes. 
6	Press SET key.	SET	The delay time is memorized and the current chamber temperature is displayed.

• The compressor starts to operate with the delay time set by the above procedure at the time of power on or after power failure. However, the start up of the low stage side compressor is affected by the chamber temperature and the cascade condenser temperature. The delay time varies depending on how they meet the start up conditions.

ROUTINE MAINTENANCE

⚠WARNING

Always disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Cleaning of cabinet

- Clean the unit once a month. Regular cleaning keeps the unit looking new.
- Use a dry cloth to wipe off small amounts of dirt on the outside and inside of the unit and all accessories. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent.. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.)

After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the cabinet or accessories with a dry cloth.

- Never pour water onto or into the unit. Doing so can damage the electric insulation and cause failure.
- The compressor and other mechanical part are completely sealed. This unit requires absolutely no lubrication.
- There is a fan behind the compressor, so be very careful if you stick your hand into this part of the unit.

Cleaning of condenser filter

This unit is provided with the filter check lamp on the control panel. Clean the filter when this lamp lights. Clean the filter once a month even if the check lamp is not on since a clogged filter may cause shorter compressor life as well as the poor cooling.

Clean the filter by the procedure below.

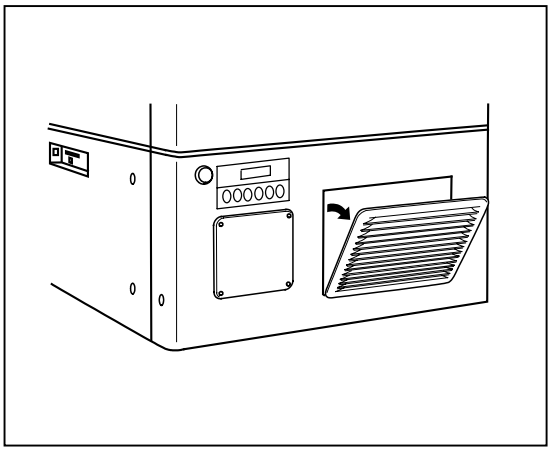
1. Open the grille by pulling it to you as shown in the figure.

2. Take out the condenser filter.

3. Wash the filter with water.

4. Replace the filter and the grille.

5. Check that the filter check lamp is off in the event the check lamp was ON.



⚠WARNING

Do not touch the condenser directly when the filter is removed for cleaning. This may cause injury by hot surface.

ROUTINE MAINTENANCE

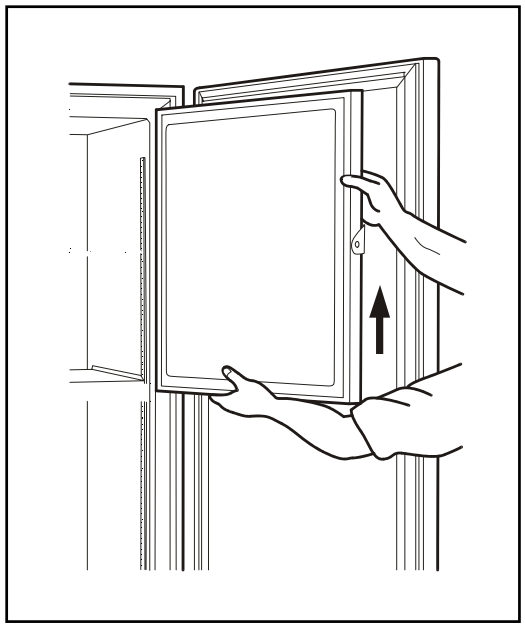
Defrosting of inside wall

The frost is built at the upper portion of the chamber and inner door. The excessive frost possibly make some gap between the cabinet and door gasket, which may cause poor cooling. Remove the frost on the inner door with a scraper enclosed with the unit. Following shows the procedure for removing the chamber frost.

Note: For removing the frost, do not use a tool with sharp edge such as a knife or a screw driver.

1. Turn off the back-up system if applicable.

2. Take out and transfer all the contents to another freezer or a container which is refrigerated by liquid carbon dioxide or dry ice.



3. Turn off the power switch of the freezer.

4. Open the outer door and inner door. Remove the inner door by lifting up as shown in the figure.

5. Leave the freezer as it is.

6. The water accumulated on the bottom of the chamber should be wiped up with a dry cloth.

7. After cleaning the chamber and inner door, replace the inner door and start up the unit according to the procedure on page 13.

8. Put back the articles into the sufficiently cooled freezer compartment.

9. Turn on the back-up system if it is provided.

TROUBLE SHOOTING

If the unit malfunctions, check out the following before calling for service.

The chamber is not cooled at all

1. The circuit breaker of power source is active.
2. The voltage is too low. In this case, call an electrician.
3. The power switch is not ON.
4. The large amount of articles (load) is stored in the chamber at one time.

The cooling is poor

1. The ambient temperature is too high.
2. The latch of inner door is not closed completely. The outer door is not closed firmly.
(The frost or ice between the cabinet and door gasket possibly prevents door seal.)
3. The air intake vent is blocked.
4. The condenser filter is clogged. Always clean the filter when the filter check lamp is lit.
5. The set temperature is not inputted properly.
6. The freezer is not away from the direct sunlight.
7. There is any heating source near the freezer.
8. A rubber cap and insulation for the access port are not set correctly.
9. You put too many unfrozen articles into the freezer compartment.

Alarm test key cannot actuate the alarm

The alarm is activated only when the power switch is ON.
1. The nickel-metal-hydride battery has been discharged entirely. In this case, operate the freezer for about 3 hours and depress the alarm test key again. Entirely discharged cell requires about 2 days' operation of the freezer.
2. When only the buzzer or only the alarm is actuated by the alarm test key, the unactuated part is out of order, and must be replaced.

Noise

1. The freezer is not installed on the sturdy floor.
2. The freezer is not leveled with the leveling feet.
3. There is anything touching the frame.
4. The freezer is in the status immediately after start up.
The unit sometimes causes a noise when the chamber temperature is high due to the large load. The noise gets less and less accompanying with the cooling of the chamber.

Back-up test switch does not operate normally (if the back-up system is provided)

1. The liquid carbon dioxide tank is empty.
2. The valve of the carbon dioxide tank is not opened.
3. The ambient temperature is too high. In this case, move the tank to a cool location.
Inquire at liquid carbon dioxide suppliers about its installation, removal, adjustment, and examination.

REPLACEMENT OF BATTERY

1. Location of a nickel-metal-hydride battery

This unit is provided a nickel-metal-hydride battery for the power failure warning device. The battery is located in the electrical box inside the cover on the lower left side. (Fig. 1)

The high voltage components are enclosed in the electrical box. The cover should be removed by a qualified engineer or a service personnel only to prevent the electric shock..

2. Removal of nickel-metal-hydride battery

1) Turn off the power switch and disconnect the power supply plug.
2) As shown in the Fig. 2, remove 7 screws fixing the side cover with a screw driver and remove the side cover..
3) Remove 4 screws fixing the electrical box cover with a screw driver. (Fig. 3)
4) Disconnect the battery connector and remove 2 screws fixing the battery mounting plate. (Fig. 4)
5) Take out the battery.
6) Follow the procedure for recycling or proper disposal.

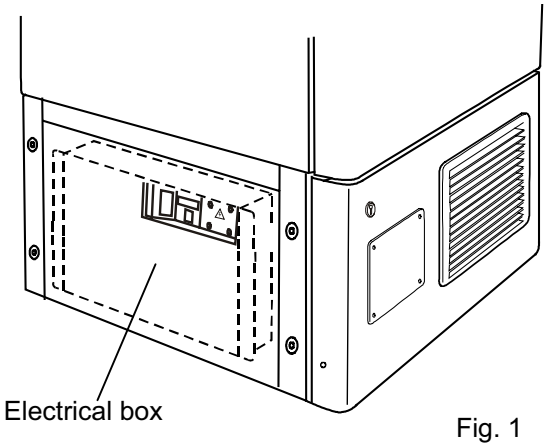


Fig. 1

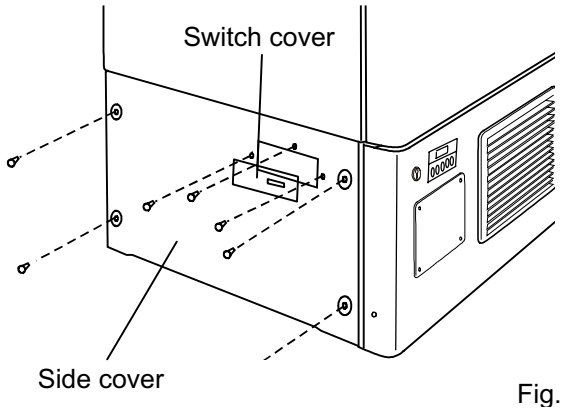


Fig. 2

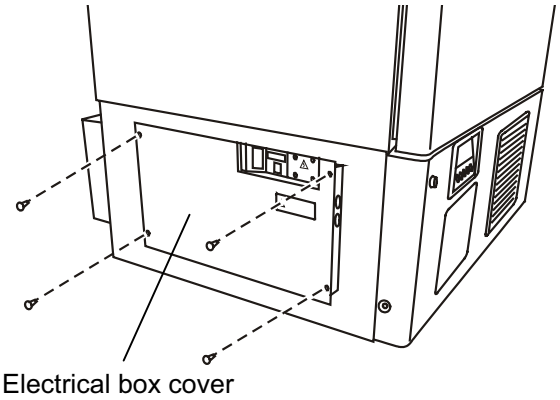


Fig. 3

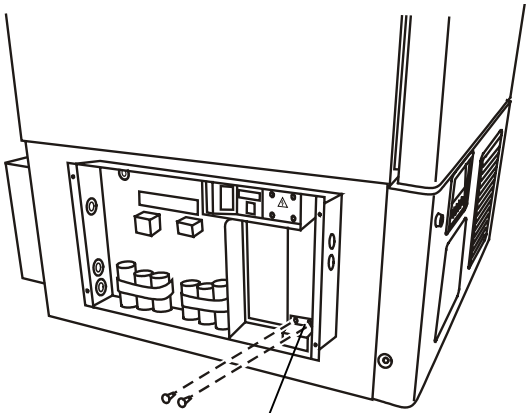


Fig. 4

DISPOSAL OF UNIT

⚠WARNING

If the unit is to be stored unused in an unsupervised area for an extended period **ensure that children do not have access and doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Always remove doors to prevent accidents such as suffocation.

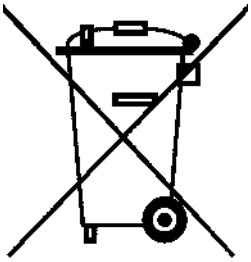
Recycle of battery

The unit contains a rechargeable battery. The battery is recyclable. At the end of it's useful life, check with you local solid officials option or proper disposal.

∗ Label indication is obliged to comply with Taiwanese battery regulation.

Note:
This symbol mark and recycle system are applied only to EU countries and not applied to the countries in the other area of the world.

Waste Electrical and Electronic Equipment (WEEE) Directive-2002/96/EC



(English)
Your SANYO product is designed and manufactured with high quality materials and components which can be recycled and reused.

This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from your household waste.

Please dispose of this equipment at your local community waste collection/recycling centre.

In the European Union there are separate collection systems for used electrical and electronic products.

Please help us to conserve the environment we live in!

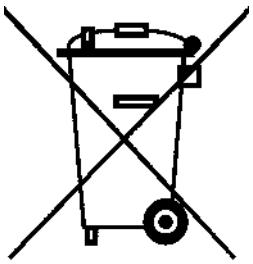
(German)
Ihr SANYO Produkt wurde entworfen und hergestellt mit qualitativ hochwertigen Materialien und Komponenten, die recycelt und wiederverwendet werden können.

Dieses Symbol bedeutet, daß elektrische und elektronische Geräte am Ende ihrer Nutzungsdauer von Hausmüll getrennt entsorgt werden sollen.

Bitte entsorgen Sie dieses Gerät bei Ihrer örtlichen kommunalen Sammelstelle oder im Recycling Centre.

In der Europäischen Union gibt es unterschiedliche Sammelsysteme für Elektrik- und Elektronikgeräte.

Helfen Sie uns bitte, die Umwelt zu erhalten, in der wir leben!



(French)
Votre produit Sanyo est conçu et fabriqué avec des matèriels et des composants de qualité supérieure qui peuvent être recyclés et réutilisés.

Ce symbole signifie que les équipements électriques et électroniques en fin de vie doivent être éliminés séparément des ordures ménagères.

Nous vous prions donc de confier cet équipement à votre centre local de collecte/recyclage.
Dans l'Union Européenne, il existe des systèmes sélectifs de collecte pour les produits électriques et électroniques usagés.

Aidez-nous à conserver l'environnement dans lequel nous vivons !

Les machines ou appareils électriques et électroniques contiennent fréquemment des matières qui, si elles sont traitées ou éliminées de manière inappropriée, peuvent s'avérer potentiellement dangereuses pour la santé humaine et pour l'environnement.
Cependant, ces matières sont nécessaires au bon fonctionnement de votre appareil ou de votre machine. Pour cette raison, il vous est demandé de ne pas vous débarrasser de votre appareil ou machine usagé avec vos ordures ménagères.

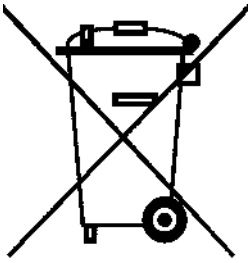
(Spanish)
Los productos SANYO están diseñados y fabricados con materiales y componentes de alta calidad, que pueden ser reciclados y reutilizados.

Este símbolo significa que el equipo eléctrico y electrónico, al final de su ciclo de vida, no se debe desechar con el resto de residuos domésticos.

Por favor, deposite su viejo "televisor" en el punto de recogida de residuos o contacte con su administración local.

En la Unión Europea existen sistemas de recogida específicos para residuos de aparatos eléctricos y electrónicos.

Por favor, ayúdenos a conservar el medio ambiente!



(Portuguese)
O seu produto SANYO foi concebido e produzido com materiais e componentes de alta qualidade que podem ser reciclados e reutilizados.

Este símbolo significa que o equipamento eléctrico e electrónico no final da sua vida útil deverá ser descartado separadamente do seu lixo doméstico.

Por favor, entregue este equipamento no seu ponto local de recolha/reciclagem.

Na União Europeia existem sistemas de recolha separados para produtos eléctricos e electrónicos usados.

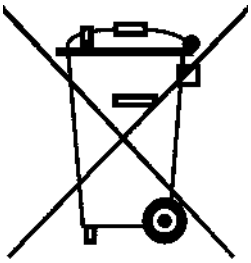
Por favor, ajude-nos a conservar o ambiente em que vivemos!

(Italian)
Il vostro prodotto SANYO è stato costruito da materiali e componenti di alta qualità, che sono riutilizzabili o riciclabili.

Prodotti elettrici ed elettronici portando questo simbolo alla fine dell'uso devono essere smaltiti separatamente dai rifiuti casalinghi.

Vi preghiamo di smaltire questo apparecchio al deposito comunale.
Nell'Unione Europea esistono sistemi di raccolta differenziata per prodotti elettrici ed elettronici.

Aiutateci a conservare l'ambiente in cui viviamo!



(Dutch)
Sanyo producten zijn ontwikkeld en gefabriceerd uit eerste kwaliteit materialen, de onderdelen kunnen worden gerecycled en weer worden gebruikt.

Het symbool betekent dat de elektrische en elektronische onderdelen wanneer deze vernietigd gaan worden , dit separaat gebeurt van het normale huisafval.

Zorg ervoor dat het verwijderen van de apparatuur bij de lokaal erkende instanties gaat gebeuren.
In de Europese Unie wordt de gebruikte elektrische en elektronische apparatuur bij de daarvoor wettelijke instanties aangeboden.

Alstublieft help allen mee om het milieu te beschermen.

(Swedish)
Din SANYO produkt är designad och tillverkad av material och komponenter med hög kvalitet som kan återvinnas och återanvändas.

Denna symbol betyder att elektriska och elektroniska produkter, efter slutanvändande, skall sorteras och lämnas separat från Ditt hushållsavfall.

Vänligen, lämna denna produkt hos Din lokala mottagningstation för avfall/återvinningsstation.

Inom den Europeiska Unionen finns det separata återvinningssystem för begagnade elektriska och elektroniska produkter.

Vänligen, hjälp oss att bevara miljön vi lever i!

TEMPERATURE RECORDER [OPTION]

An automatic temperature recorders is available for this freezer as the optional component. The type of the recorder is MTR-G85.
Following shows the attachment procedure.

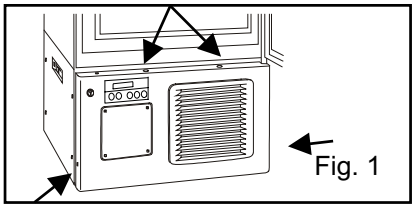


Fig. 1

1. Remove four screws on the front panel and take it off. By removing four screws, take off the left side panel. Then take off the cover for the recorder mounting space by removing four screws. (Fig. 1)

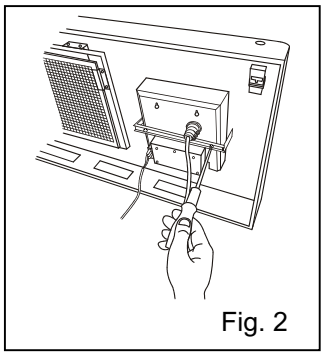


Fig. 2

2. As shown in the Fig. 2, insert the temperature recorder to the mounting space and fix it to the back side of the front panel by using the recorder fixture enclosed with the recorder.

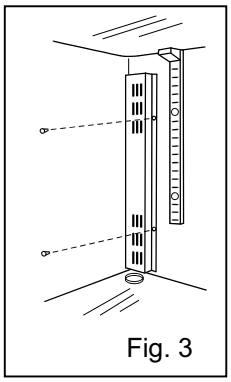


Fig. 3

3. Take off the recorder sensor cover in the chamber (bottom left side) by removing two screws. Then remove the rubber cap and insulation covering the sensor port. (Fig. 3)

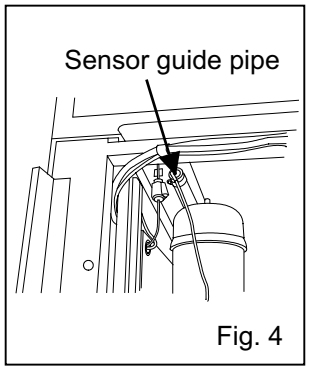


Fig. 4

4. As shown in the Fig. 4, pass the recorder sensor through the sensor guide pipe from the front to the back. The sensor guide pipe is provided on the upper left side of the base compartment.

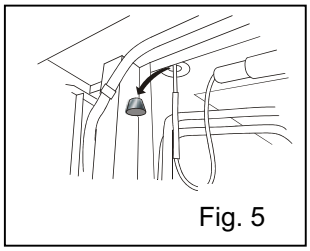


Fig. 5

5. Take out the recorder sensor from the guide pipe at the back side and pass the sensor to the chamber through the access port. (Fig. 5)

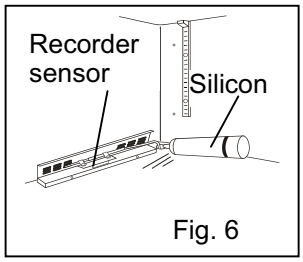


Fig. 6

6. Attach the recorder sensor on the sensor cover with the enclosed clips. Seal the sensor port with a silicon and replace the recorder sensor cover. Fix the cover to the inside wall. (Fig. 6)

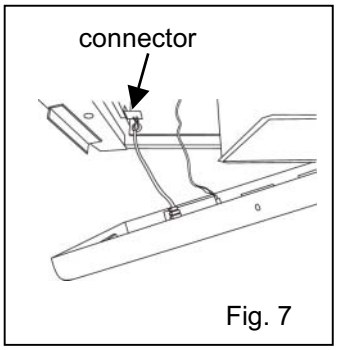


Fig. 7

7. Remove the connector cover. Connect the recorder connector at the end of the power cord with the white connector on the left of the base compartment. Bind the extra lead wire of the sensor with a nylon clip on the back of the recorder. (Fig. 7)

8. Replace the left side panel and front panel and fix them with screws.

9. Operate the freezer until the chamber temperature gets to the set temperature. Check the recorded temperature and chamber temperature displayed on the control panel. Adjust the zero adjustment volume on the temperature recorder so that the recorded temperature can corresponds with the displayed temperature if they are not compliance each other

BACK-UP SYSTEM [OPTION]

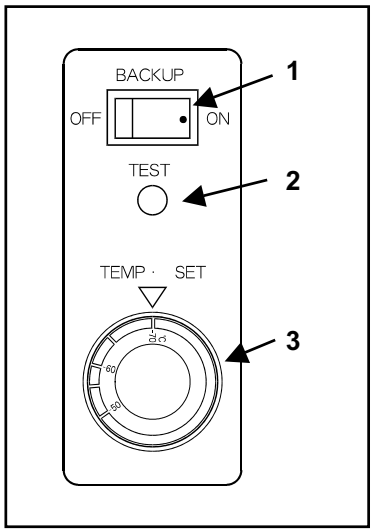
> **⚠ WARNING**
> **As with any equipment that uses CO_2 gas, there is a likelihood of oxygen depletion in the vicinity of the equipment. It is important that you assess the work site to endure there is suitable and sufficient ventilation. If restricted ventilation is suspected, then other methods of ensuring a safe environment must be considered. These may include atmosphere monitoring and warning devices.**

This freezer can be provided with a back-up system (CVK-UB2) which is available as an optional component. For the installation, refer to the instruction manual enclosed with the system.

1. Switch of back-up system (BACKUP)
When turning on the system, the lamp is brightened. This means that the system is ready. To stop the operation of the system, turn off this switch.

2. Test switch (TEST)
This switch is for checking the operation of back-up system. Pressing this switch is resulted in the release of liquid carbon dioxide without system operation.

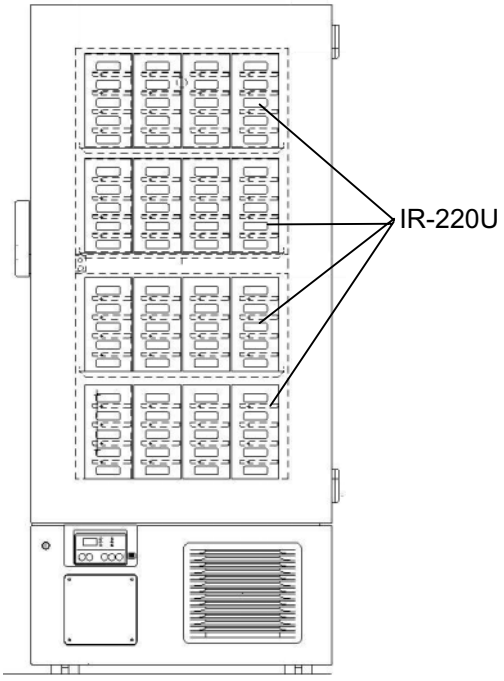
3. Temperature setting knob (TEMP. SET)
With this knob, set the temperature at which the system is operated. The effective set temperature range is between -50°C and -70°C.



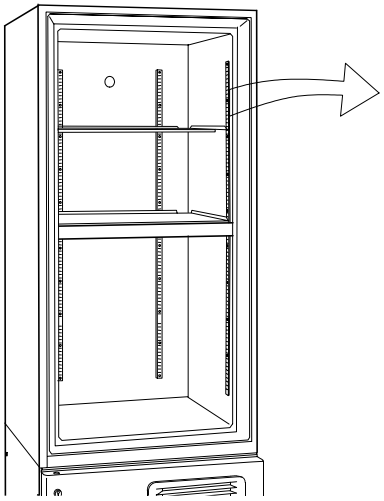
OPTIONAL COMPONENTS

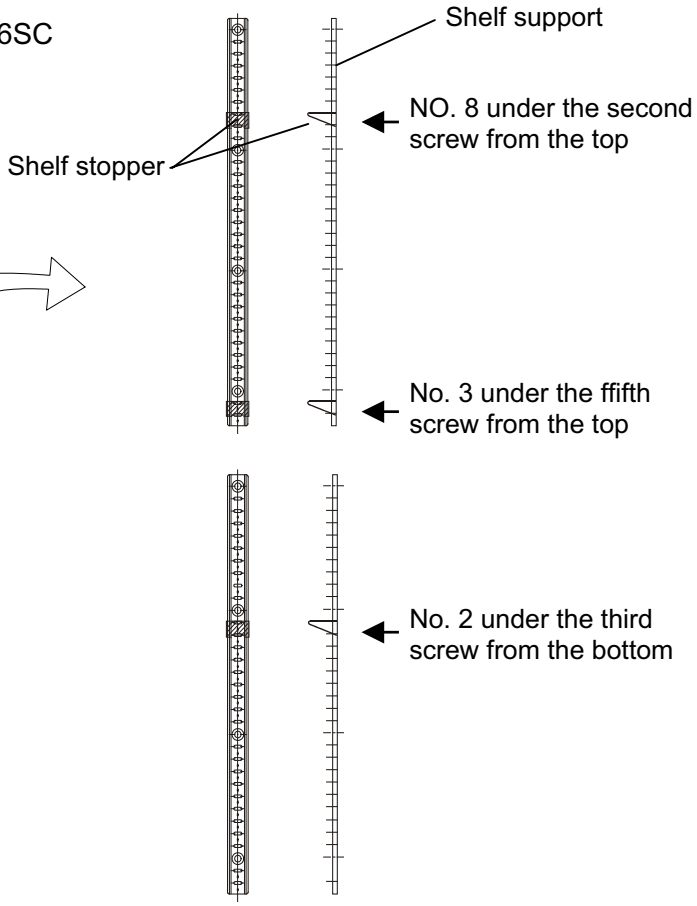
Inventory rack

The optional inventory rack is useful to store the precious materials in the chamber effectively. When the rack is used, it is necessary to adjust the height of the shelves. Set the shelf support as shown in the figure below.



MDF-U5386SC




Shelf support
NO. 8 under the second screw from the top
Shelf stopper
No. 3 under the ffifth screw from the top
No. 2 under the third screw from the bottom

SPECIFICATIONS

Name	Ultra-Low Temperature Freezer	
Model	MDF-U5386S	MDF-U5386SC (for U.S.A. only)
External dimensions	W890 x D867 x H1990 (mm)	
Internal dimensions	W630 x D600 x H1280 (mm)	
Effective capacity	483 L	
Exterior	Painted steel	
Interior	Painted steel	
Outer door	Painted steel	
Inner door	ABS resin panel with stainless frame, 2 doors	
Shelf	Stainless steel, 3 shelves (adjustable) W608 x D533 (mm), Load; 50 kg/shelf	
Access port	17 mm diameter, 3 locations (back, bottom left/right corner)	
Insulation	Rigid polyurethane foamed-in place	
Compressor	Hermetic type, Output; 1100 W (high stage side), 1100W (low stage side)	
Evaporator	Tube on sheet type	
Condenser	Fin and tube type (high stage side), Shell and tube type (low stage side)	
Refrigerant	R-407D (high stage side), R-508 (low stage side)	
Temperature controller	Microcomputer control system	
Temperature display	Digital display	
Thermal sensor	Platinum resistance (Pt 1000Ω)	
Alarm	High temp. alarm, Low temp. alarm, Power failure alarm Filter check, Battery alarm	
Remote alarm contact	Allowable contact capacity: DC 30V, 2A	
Battery	Nickel-metal-hydride battery, DC6V, 1100mAh, Auto-recharge	
Accessories	1 set of key, 1 scraper	
Weight	315 kg	320 kg
Voltage booster	None	Built-in
Optional component	Inventory rack (IR-220U) Automatic temperature recorder (MTR-G85) Back-up system (CVK-UB2): LCO_2	

Note:
• Design or specifications will be subject to change without notice.
• The battery for power failure alarm is an article for consumption. It is recommended that the battery will be replaced about every 3 years. Contact Sanyo sales agency at the time of replacement of the battery for recycling.

PERFORMANCE

Cooling performance	-86°C at the center of the chamber (ambient temperature; 30°C, no load)			
Temperature control range	-50°C to -86°C (ambient temperature; 30°C, no load)			
Power source	220V, 50Hz	220V, 60Hz	230V, 50Hz	240V, 50Hz
Rated power consumption	1080 W	1180 W	1160 W	1100 W
Noise level	49 dB [A] (background noise; 20 dB)			
Maximum pressure	2.7 MPa			

Note : The unit with CE mark complies with EC directives 89/336/EEC, 93/68/EEC and 73/23/EEC

SPECIFICATIONS

Name	Ultra-Low Temperature Freezer	
Model	MDF-U7386S	MDF-U7386SC (for U.S.A. only)
External dimensions	W1130 x D867 x H1990 (mm)	
Internal dimensions	W870 x D600 x H1280 (mm)	
Effective capacity	668 L	
Exterior	Painted steel	
Interior	Painted steel	
Outer door	Painted steel	
Inner door	ABS resin panel with stainless frame, 2 doors	
Shelf	Stainless steel, 3 shelves (adjustable) W848 x D533 (mm), Load; 50 kg/shelf	
Access port	17 mm diameter, 3 locations (back, bottom left/right corner)	
Insulation	Rigid polyurethane foamed-in place	
Compressor	Hermetic type, Output; 1100 W (high stage side), 1100W (low stage side)	
Evaporator	Tube on sheet type	
Condenser	Fin and tube type (high stage side), Shell and tube type (low stage side)	
Refrigerant	R-407D (high stage side), R-508 (low stage side)	
Temperature controller	Microcomputer control system	
Temperature display	Digital display	
Thermal sensor	Platinum resistance (Pt 1000Ω)	
Alarm	High temp. alarm, Low temp. alarm, Power failure alarm Filter check, Battery alarm	
Remote alarm contact	Allowable contact capacity: DC 30V, 2A	
Battery	Nickel-metal-hydride battery, DC6V, 1100mAh, Auto-recharge	
Accessories	1 set of key, 1 scraper	
Weight	355 kg	360 kg
Voltage booster	None	Built-in
Optional component	Inventory rack (IR-220U) Automatic temperature recorder (MTR-G85) Back-up system (CVK-UB2): LCO_2	

Note:
• Design or specifications will be subject to change without notice.
• The battery for power failure alarm is an article for consumption. It is recommended that the battery will be replaced about every 3 years. Contact Sanyo sales agency at the time of replacement of the battery for recycling.

PERFORMANCE

Cooling performance	-86°C at the center of the chamber (ambient temperature; 30°C, no load)			
Temperature control range	-50°C to -86°C (ambient temperature; 30°C, no load)			
Power source	220V, 50Hz	220V, 60Hz	230V, 50Hz	240V, 50Hz
Rated power consumption	1080 W	1210 W	1140 W	1120 W
Noise level	49 dB [A] (background noise; 20 dB)			
Maximum pressure	2.7 MPa			

Note : The unit with CE mark complies with EC directives 89/336/EEC, 93/68/EEC and 73/23/EEC

⚠ CAUTION

Please fill in this form before servicing.
Hand over this form to the service engineer to keep for his and your safety.

Safety check sheet

1. Freezer contents :
   Risk of infection: ☐Yes ☐No
   Risk of toxicity: ☐Yes ☐No
   Risk from radioactive sources: ☐Yes ☐No

   (List all potentially hazardous materials that have been stored in this unit.)
   Notes :

2. Contamination of the unit
   Unit interior ☐Yes ☐No
   No contamination ☐Yes ☐No
   Decontaminated ☐Yes ☐No
   Contaminated ☐Yes ☐No
   Others:

3. Instructions for safe repair/maintenance of the unit
   a) The unit is safe to work on ☐Yes ☐No
   b) There is some danger (see below) ☐Yes ☐No
   Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :
Signature :
Address, Division :
Telephone :

Product name: Ultra-low temperature freezer	Model: MDF-	Serial number:	Date of installation:

Please decontaminate the unit yourself before calling the service engineer.

JK1184-200B